The Builder.

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ILLUSTRATIONS.

Interior, Norwich Union Life Assurance Office.....Mr. G. J. Skipper, F.R.I.B.A., Architect.
New Empire Theatre, Sunderland.....Messrs. W. & T. R. Milburn, FF.R.I.B.A., Architects.
1. Exterior View.
2. Interior from Proscenium Opening.
3. Interior looking towards Stage.
4. Waiting Hall in Connexion with Grand Circle.
House at Shanghai.....Messrs. Denham & Rose, Architects.
St. Andrews, Rockbourne, Hants: as restored.....Mr. C. E. Ponting, F.S.A., Architect.

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The Government Offices.

SPECIAL invitation to representatives of the Press to inspect the new Government Offices in Parliament-street on Friday the 5th, may be taken to mark the completion of a kind of first stage in the carrying out of the building. There is a great deal yet to be done, but the portions of the building now finished are complete in themselves, and what has to be added will only be the complement of what is already done.

Brydon's fine circular courtyard, 160 ft. in diameter, still wants one-third of its circumference, the building of the Institution of Civil Engineers standing in the way of its completion at present; but by turning one's back on the latter and looking to the completed portion one can realise its full effect, as all is finished that can be seen at one angle of vision. It makes a very fine bit of classic architecture; the only point that seems a little weak is the totally unadorned and unemphasised character of the ground floor windows within the heavy rusticated arcading; they look like afterthoughts unconnected with the architecture. The carriageway arcade leading into the circular court from Charles-street has been carried out almost exactly from Brydon's drawings; the bronze gates were designed in the Office of Works; they are good pieces of metal-work, and have a heavy architectural character in keeping with their position and surroundings. There will of course eventually be a similar carriageway entrance and gates from Great George-street, where the Institution of Civil Engineers' building now stands.

The main idea of the plan (which will be found in our issue for March 25, 1899) is the circular courtyard through which both central axes of the building pass, and a large nearly square courtyard (110 ft. by 100 ft.) to east and west of this, around which rooms are grouped; some smaller open courts affording light only to corridors. The main staircase, entered in the centre of the Parliament-street front, is not a very successful piece of architectural treatment. The lower flight, going straight up opposite the entrance, is too narrow between its high containing walls; and the design of the staircase generally is too scrappy and wanting in coherence. There are balustrades and terminating pedestals which seem to have no connexion with the columns contiguous to them, and look like afterthoughts built in between, without forming part of the architectural design. The omission of the sculptured or modelled plaster frieze round the upper part of the staircase hall, which was indicated in the original drawings, is a mistake; it would have served to bind the whole together and to give a motive for the secondary cornice or string course running round the wall. The balustrade, wall-facing, steps, and columns, are carried out in Mazzano marble, a material of a rather nondescript colour, almost what one may call "stone-colour," which takes a fine polish and can be had in large sizes (the columns are monoliths); but it is not a very agreeable colour in a decorative sense.

Apart from the main staircase, the principal architectural features of the interior are the two large rooms for deputations in connexion respectively with the Education Department and the Local Government Board, the two Departments between which the building will be divided. On each side of these large deputation rooms are rooms for the Minister and the principal official connected with the Department. The Local Government Board Room, with its richly-veined Pavonazzo columns and modelled ceiling, is a very fine apartment. These principal rooms have wainscot oak doors and panelling, and the woodwork is treated throughout in a simple and bold manner, with some good carved detail. Everything in the fittings of the principal rooms is in good taste.

The corridors and the minor rooms are treated throughout the building in a nearly uniform manner, and a uniform and rather effective design of stair-railing has been adopted throughout the building. This and other details are designed in the Office of Works. But Brydon had left more detail drawings than we were aware of, and in the main his indications have been pretty faithfully followed, and in one or two instances where they have been departed from we must admit that the alterations are rather improvements. The single wrought-iron balcony, for instance, which he had shown to one window only of the circular court (above the carriage

entrance), would certainly have interfered with the general monumental character of the architectural treatment, and was much better omitted. An important structural improvement, also, has been made, in the adoption of flat concrete roofing in place of Brydon's slated roofs, by which means an additional story has been obtained at the top of the building.

Taken as a whole, the building is one in which good taste is seen in nearly all the details, although, as we have before remarked, the exterior architecture is rather tame and is hardly all one might have expected from so great an opportunity. The one really fine and impressive architectural effect in the building is—or rather will be when completed—the great circular court; and it is satisfactory to observe that this has been worked in without any practical injury to the plan. The rooms looking on to this court are small offices in which the curvature of the walls involves no practical inconvenience, and what may be called the spandrels of the circle are utilised as small courts for light, so that the circular portion of the plan fits into the rectangular portion without leaving any awkward spaces in rooms or corridors.

The omission of the two cupolas on the Charles-street side, intended in the original design, we shall not cease to regret; it will injure the effect of the building, as seen from St. James's Park, very materially, and render it a lop-sided design instead of a complete and symmetrical one. The reason given for their omission, that they would shut out some of the light from the offices on the north side of Charles-street, we have always considered a most inadequate one; and as we are assured that considerations of economy had nothing to do with the omission (or with any other modifications of the design), we can only hope that this point may be reconsidered, and Brydon's design eventually carried out in its entirety. There is nothing to prevent this being done now; the substructure for both the cupolas is there; and the design can still be completed, if the Government can make up their mind that the architectural effect of a great building is worth more than to be sacrificed for what we must think a rather imaginary practical objection.

LINES OF THRUST IN MASONRY ARCHES.

By J. D. W. BALL.

ALTHOUGH there are evidences that the principle of the arch was understood and used by the Chinese, the Egyptians, and the Romans many hundreds of years B.C., it is only of recent years that any precise theory of the stresses in arches has been developed.

The use of iron and steel for arch ribs of large span demanded for their economical construction the development of a theory giving results to a much greater degree of accuracy than the rough-and ready method described in most of the old text-books on construction, for ascertaining whether a line of thrust could be drawn sufficiently within the arch ring to satisfy the designer of its stability. This method consists of dividing the arch into real or imaginary voussoirs, and by trial and error obtaining a value for the horizontal component of the thrust which will enable a funicular polygon to be drawn within certain limits of the arch ring.

The method fails to give a reliable result under the simple condition of symmetrical load, because it assumes a value for the horizontal thrust which can only be correctly ascertained after the thrust line has been determined, and, moreover, does not fix the position of the thrust line in a vertical direction. It breaks down altogether in the general case of an unsymmetrical load, because it is not known at what point of the span the shear is zero and the resultant thrust, therefore, horizontal.

A later graphical method devised by Professor Fuller and modified by Professor Perry enables one to determine whether a thrust line can be drawn which will satisfy the condition of loading, regular or irregular, and lie within the middle third or the middle half of the arch ring as the case may be; but there may be many such, and the result is at best indefinite. The problem, therefore, remains to determine which of the various possible lines of thrust satisfies the conditions of the arch as built. It would seem to be necessary to do this to properly design an arch, for the unit stress allowed should surely be varied in the two extreme cases in which a line of thrust can be drawn satisfying the conditions of rigidity and loading which most nearly obtain in practice—(1) scarcely departing from the centre line of the arch ring, and (2) just within the limit considered compatible with the stability of the arch, whether it be the middle third or the middle half.

For the brick or masonry arch, or, indeed, any arch the ends of which may be regarded as rigidly fixed to the skewbacks, the conditions of rigidity which precisely determine the form the line of thrust will take are three in number, and are based on the fact that the bending of any short length of the arch treated by itself would, regarding one end as fixed, (a) tend to raise or lower the other end, (b) tend to move it in a horizontal direction, and (c) tend to change the direction of the free end. It is known that in the case of the arch whose ends are rigidly bedded on the springers none of these movements take place, hence the sum total of the three movements referred to above throughout the arch must be zero.

Referring to Fig. 1, these three conditions may be stated thus:—(a) That the sum of all the intercepts *EF* between the thrust line and the centre line of the arch ring, representing the bending moments at each section considered, multiplied by *AD* the distance of each section from either abutment, must be zero; (b) that the sum of all the intercepts *EF*, multiplied by *ED* the ordinate of the centre line measured from the springing line or any convenient horizontal axis, must be zero; (c) that the sum of all the intercepts *EF* must be zero.

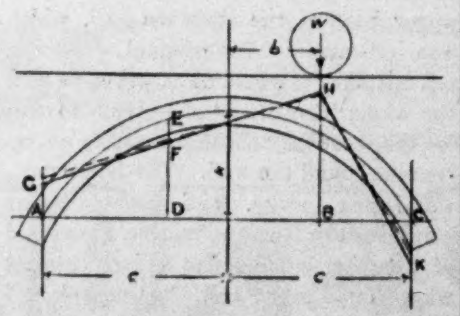


Fig. 1.

In the case of an arch built and loaded symmetrically about the centre condition (a) becomes the same as (c) and need not be considered. These conditions are based on the assumption that the arch ring is of uniform thickness throughout, and if it is not, each *EF* must be divided by a number representing the moment of inertia of the section—for instance, the cube of the thickness of the arch at the particular section.

For flat segmental arches of a rise equal to one-fourth or one-fifth the span it is possible to work out general results without appreciable error by assuming the form of the arch to be a parabola. Thus for such arches and approximately for segmental arches of rise equal to one-third the span, the line of thrust due to the weight of the arch and covering does not perceptibly depart from the centre line of the arch, while the line of thrust *GHK*, Fig. 1, due to any concentrated load is determined by the values

$$AG = \frac{2}{15} \times \frac{c + 5b}{c + b} \times k$$

$$BH = \frac{6}{5} k$$

$$CK = \frac{2}{15} \times \frac{c - 5b}{c - b} \times k$$

this when negative being measured below *C*. The various symbols used are *c* for half the span, *b* the distance of the load from the crown, and *k* the rise of that part of the centre line of the arch intercepted between the vertical faces of the abutments, for that is the only part of the arch carrying load as distinct from the portions omitted at the springing which simply transmit load to the abutments.

The position of the load which produces the greatest bending moment in the arch ring is when $b = \cdot 45c$, and to obtain the worst effect as regards instability of the arch the loads should be disposed on half the arch about this position as a centre.

The horizontal component of the thrust is equal to $15\ W\ (c^3 - b^3)^2 \div 32kc^3$ where *W* is the load, and calling this *H*, the reactions at the abutments R_1 and R_2 will be obtained from the ratios

$$R_1 : H :: BH - AG : c + b$$
$$R_2 : H :: BH + CK : c - b$$

If one takes a rectangular piece of paper and bends it into the form of an arch, on applying pressure with a pencil to any part it will be seen that the deformation is quite local as regards a direction from abutment to abutment, but extends the full width of the arch in a direction parallel to the axis. Hence it seems feasible to consider any rolling load as a series of concentrated loads, allowing for distribution across the roadway over the arch, which is the direction of its greatest stiffness.

In the following example, which is of a very flat arch carrying lines of railway, this treatment has been carried out, the engine wheel loads being distributed over a width of 12 ft.

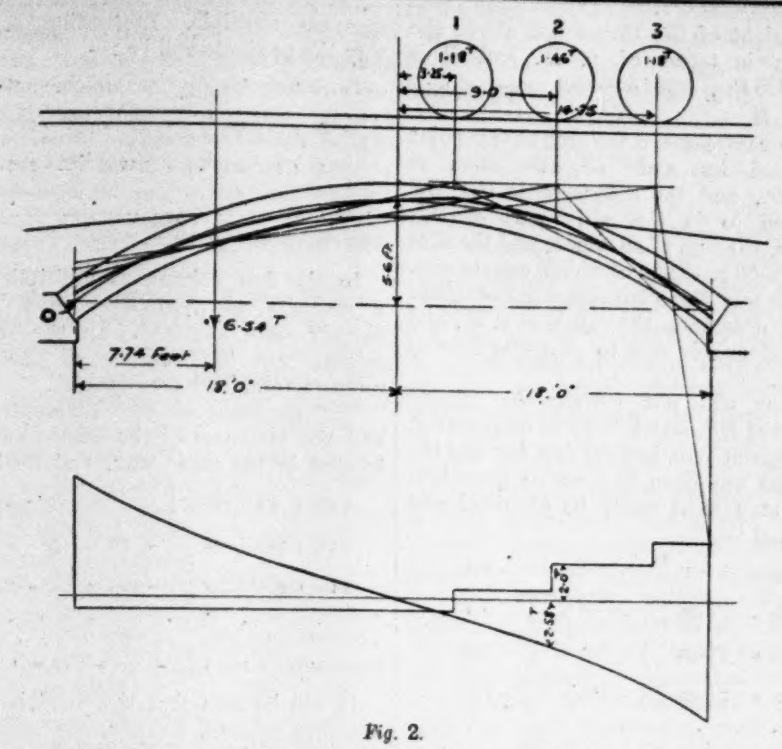


Fig. 2.

It will have been noticed that the value of *BH*, Fig. 1, is a constant and, therefore, the apices of the triangular lines of thrust all lie on a horizontal line higher than the centre line of the arch at the crown by an amount equal to one-fifth of the rise of that portion of the central line intercepted between the abutments. Hence it only remains to calculate the values of *AG* and *CK* for each of the three loads, the position of which is shown in Fig. 2.

The span is 36 ft., so that $c = 18$ ft. The rise of the soffit is 5 ft. 9 in., and of the centre line, *i.e.*, k, 5·6 ft. For load (1)

$$AG = \frac{2}{15} \times \frac{18 + 5 \times 3{\cdot}25}{18 + 3{\cdot}25} \times 5{\cdot}6 = 1{\cdot}20 \text{ ft.}$$

$$CK = \frac{2}{15} \times \frac{18 - 5 \times 3{\cdot}25}{18 - 3{\cdot}25} \times 5{\cdot}6 = {\cdot}09 \text{ ft.}$$

Horizontal thrust $H = 15 \times 1{\cdot}18\ (18^2 - 3{\cdot}25^2)^{\frac{3}{2}} \div 32 \times 5{\cdot}6 \times 18^3 = 1{\cdot}69$ tons.

The 1·18 tons is the proportion of the live load corresponding to 1 ft. thickness of the arch.

Reaction at right abutment

$$R_2 = \frac{6{\cdot}72 - {\cdot}09}{18 - 3{\cdot}25} \times 1{\cdot}69 = {\cdot}76 \text{ tons.}$$

Reaction at left abutment $R_1 = 1{\cdot}18 - {\cdot}76 = {\cdot}42$ tons.

Similarly for load (2)

$AG = 1{\cdot}74$ ft.
$CK = -2{\cdot}24$ ft.
$H = 1{\cdot}26$ tons
$R_2 = 1{\cdot}26$ tons $\quad R_1 = {\cdot}20$ tons.

And for load (3)

$AG = 2{\cdot}09$ ft.
$CK = -12{\cdot}8$ ft.
$H = {\cdot}19$ tons
$R_2 = 1{\cdot}16$ tons $\quad R_1 = {\cdot}02$ tons.

From these values the lines of thrust due to each of the three concentrated loads are plotted as shown in Fig. 2.

As has been already stated, for a flat arch such as this the thrust line due to the dead load does not sensibly depart from the centre line of the arch. Hence, if W be the weight of 1 ft. thickness of half the arch, the centre of gravity of which is at a distance d from the abutment, taking moments about O,

$$W \times d = H \times k.$$

If the materials of which the arch and haunching are built have much the same specific gravity as the filling and covering of metalling or ballast, as the case may be, the area of the profile of the arch multiplied by the average weight per cubic foot is a measure of the dead load. If the weight per cubic foot of the metalling or other road surface is less than that of the brickwork and concrete in the arch and haunching, the depth of the former can be reduced in proportion and a diagram of the load in this way obtained.

The shear diagram shown in the lower half of Fig. 2 is obtained, as regards the dead load, by dividing the profile of half the arch into strips and determining the weight corresponding to each. Knowing that the shear is nil at the crown, it is only necessary to sum the several weights of these strips from this point to the abutment, the final total being the weight of half the arch, that is, the reaction at the abutment due to the dead load.

In this case it is (for a thickness of 1 ft.) 6·54 tons. By taking moments of the weights of the strips severally about the abutment and dividing the total moment by the total weight, one finds that the centre of gravity of the half arch is 7·74 ft. from the abutment. Therefore in this case the horizontal component of the thrust due to the dead load is $6{\cdot}54 \times 7{\cdot}74 \div 5{\cdot}6 = 9{\cdot}04$ tons.

In Fig. 2 the thick line shows the resultant of these various lines of thrust, namely, that due to the dead load and coinciding with the centre line of the arch ring, and the three due to the concentrated loads. Points on this resultant line of thrust are obtained at each abutment and at convenient points between; for instance, under each load and at corresponding positions in the unloaded half of the span, by finding the point of application of the resultant of the four forces the horizontal components of which are known.

As an example, the section under the middle of the three loads is here considered in detail, as at this point the resultant is farthest away from the centre line of the arch, and the bending moment on the arch ring therefore a maximum. Other points where the departure is perhaps equally great are the two abutments, but the arch here receives assistance to resist bending from the backing. The case considered is that of an arch built many years ago, and the backing consists simply of brickwork, as shown, with no concrete on top of it.

For the purpose of determining the bending moment and the position of the resultant line of thrust, reference is made to the enlarged drawing of the part of the arch under consideration shown in Fig. 3.

The total bending moment about the centre of the arch is $1{\cdot}26 \times 2{\cdot}4 + {\cdot}19 \times 1{\cdot}6 - 1{\cdot}69 \times {\cdot}15 = 3{\cdot}07$ foot-tons.

The total horizontal thrust is :—

	Tons.
Due to dead load	9·04
Due to load (1)	1·69
Due to load (2)	1·26
Due to load (3)	·19
	12·18

Hence the vertical distance of the resultant from the centre line is $3{\cdot}07 \div 12{\cdot}18 = {\cdot}25$ ft. The magnitude of the resultant thrust is obtained by compounding the horizontal component with the vertical shear, which at the section under consideration is :—

	Tons.
Due to dead load	= 2·58
Due to concentrated loads ·76 + 1·26 + 1·16 − 1·18	= 2·00
Total	= 4·58

The resultant is therefore $= \sqrt{12{\cdot}18^2 + 4{\cdot}58^2} = 13{\cdot}04$ tons.

The compressive stress produced in the arch by this thrust equals $\frac{13{\cdot}04}{1{\cdot}87 \times 1{\cdot}0}$ $= 6{\cdot}98$ tons per square foot, this being the average stress.

The maximum compressive stress at extrados and tensile stress at soffit due to the bending moment of 3·07 foot-tons is obtained by dividing this by the modulus of the section $\frac{1}{6} \times 1{\cdot}0 \times 1{\cdot}87^2 = {\cdot}57$ foot-units, the quotient being 5·26 tons per square foot.

The total compression at the extrados

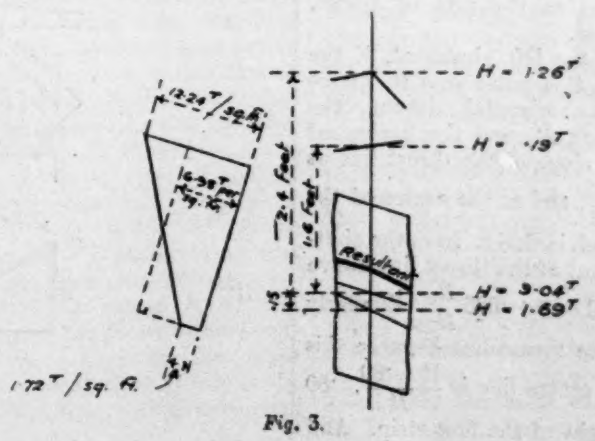


Fig. 3.

is, therefore, 6·98 + 5·26 = 12·24 tons per square foot, and the net compression at soffit

= 6·98 − 5·26 = 1·72 tons per square foot.

The distribution of stress throughout the thickness of the arch is also shown in Fig. 3.

In the case of an arch as flat as this there can be no appreciable error in using the formulæ described, and thus assuming the arch to be parabolic instead of segmental.

With segmental arches of a fourth and fifth rise, which are far more commonly used in modern practice than the extremely flat arch considered, the error is also inappreciable.

In Fig. 1 the arch there shown has a rise of one-third the span. The full line shows the line of thrust due to the concentrated load as determined by the approximate formulæ, while the dotted line is the true line of thrust determined by the summation method about to be described. So that even in this case the error is not great, and with the ordinary proportions the line of thrust due to the dead weight of an arch of this rise does not materially depart from the centre of the arch ring.

For semi-arches the approximate method cannot be employed for finding the thrust lines due to concentrated loads, and the line due to the dead load also rises materially above the centre line at the abutments.

The example which has been chosen to illustrate the summation method, which can be applied to any arch whose ends may be regarded as rigidly fixed, is that of an arch forming part of a viaduct carrying an inclined road. The span is 25 ft. and the rise 6 ft. 3 in., one springing being 1 ft. 6 in. higher than the other. The uphill half of the arch is also loaded with a live load of 2 cwt. per square foot, and the same method could be used for a concentrated load or loads.

The section of the arch is shown in Fig. 4, and the span of 25 ft. is divided into twenty equal parts, represented in the figure by centre lines. The weight of the common bricks in lime mortar of which the arch is built is 1·25 cwt. per cubic foot, and the average weight of the concrete filling and setts forming the road approximates to this figure, which has therefore been used in obtaining the weight of each strip for a section of the arch 1 ft. in thickness. These weights are shown in Fig. 4, and to each of the strips in the uphill half of the span ·12 ton has been added for live load, this being reckoned at the rate of 2 cwt. per square foot.

Starting at the left abutment, if the thrust line at this point is y ft. above a convenient horizontal datum, the vertical reaction R_1, and the horizontal thrust H, the slope of the thrust line at this point is $\frac{R_1}{H}$, and at the centre of the first strip, which is ·625 ft. from the abutment, the height of the thrust line above the datum will be $y + ·625\frac{R_1}{H}$. Similarly the slope of the thrust line between this and the next centre line is $\frac{R_1 - ·80}{H}$, ·80 being the weight of the first strip. And the height of the thrust line above the datum in terms of y, R_1, and H is $y + \frac{·625R_1}{H} + \frac{1·25(R_1 - ·80)}{H}$. The height of the centre line of the arch at this point obtained by scale or calculation is 4·50 ft., and the difference is the EF referred to in the early part of this article, the sum of all which, and the sum of various products of which, equals zero. In this way three equations are obtained which determine the values of y, R_1, and H, and enable one to plot the line of thrust.

Space will not permit the twenty values of EF, which have to be summed, to be given here, but the first few and the last one are given in order to show how they may most easily be obtained and summed :—

$$y + ·625\frac{R_1}{H} - 3·45$$
$$y + 3\left(·625\frac{R_1}{H}\right) - ·80 \times \frac{1·25}{H} - 4·50$$
$$y + 5\left(·625\frac{R_1}{H}\right) - 2·31 \times \frac{1·25}{H} - 5·38$$
$$y + 7\left(·625\frac{R_1}{H}\right) - 4·45 \times \frac{1·25}{H} - 6·10$$
$$\cdot \quad \cdot \quad \cdot \quad \cdot$$
$$y + 39\left(·625\frac{R_1}{H}\right) - 95·19 \times \frac{1·25}{H} - 2·36$$

$$\text{Total } 20y + 250\frac{R_1}{H} - \frac{907·34}{H} - 123·73 = 0$$

The second column $\left(\text{multiples of } \frac{R_1}{H}\right)$ explains itself, and can be summed as a series of twenty terms of which the mean is $\frac{39+1}{2}\left(·625\frac{R_1}{H}\right)$.

In the third column each successive figure is obtained from the one preceding it by the addition of a gradually-increasing quantity.

Thus ·80 is the weight of the first strip, 2·31 is ·80 + (·80 + ·71), and is obtained by adding the first two weights to the first.

4·45 is obtained by adding to the last figure 2·31, the sum of the weights of the first three strips (·80 + ·71 + ·63). The next will be 4·45 + (·80 + ·71 + ·63 + ·57), and so on. The last column consists of the ordinates of the centre line of the arch which are given in Fig. 4.

In taking the products of these figures and the distance of each strip from the abutment it is not necessary to use the actual distances, for the proportional numbers 1, 3, 5, 7, etc., will do equally well since the sum is zero, and using the actual distances would only introduce a common multiple. Proceeding in this way the products will be :—

$$y + ·625\frac{R_1}{H} - ·45$$
$$3y + 9\left(·625\frac{R_1}{H}\right) - 2·4 \times \frac{1·25}{H} - 13·50$$
$$5y + 25\left(·625\frac{R_1}{H}\right) - 11·55 \times \frac{1·25}{H} - 29·90$$
$$\cdot \quad \cdot \quad \cdot \quad \cdot$$
$$\text{Total } 400y + 6662·5\frac{R_1}{H} - \frac{38586}{H} - 2407 = 0$$

In the first column as multipliers of y are the odd numbers which have already been summed. In the second column are the squares of the odd numbers obtained from tables.

The products of the intercepts EF and the ordinates of the centre line are treated in the same way, and read

$$3·45y + 3·45\left(·625\frac{R_1}{H}\right) - 11·90$$
$$4·50y + 13·50\left(·625\frac{R_1}{H}\right) - 3·6 \times \frac{1·25}{H} - 20·25$$
$$5·38y + 26·90\left(·625\frac{R_1}{H}\right) - 12·4 \times \frac{1·25}{H} - 28·94$$
$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$
$$\text{Total } 123·73y + 1504·6\frac{R_1}{H} - \frac{5169}{H} - 820·4 = 0$$

It will be seen that the coefficients of the first column, namely, the ordinates of the centre line for each strip, are the same as in the last column of the first summation. The coefficients in the second column are the same as those in the last column of the second of the three summations ; while in the last column appear the squares of the coefficients in the first column, so that much of the work is repetition, and a good deal of it can be taken from tables.

From the three equations thus obtained, which, when simplified, read :—

$$y + 12·50\frac{R_1}{H} - \frac{45·37}{H} - 6·187 = 0$$
$$y + 16·66\frac{R_1}{H} - \frac{66·46}{H} - 6·019 = 0$$
$$y + 12·16\frac{R_1}{H} - \frac{41·79}{H} - 6·632 = 0$$

the values of y, R_1, and H are determined. Thus

y = 2·50 ft.
R_1 = 4·90 tons
H = 4·30 tons

and from these the ordinates of the thrust line are worked out and plotted as in Fig. 4.

The calculated weight of each strip is given in the figure, and also the ordinates of the centre line of the arch and the ordinates of the thrust line, measured on the centre line of each strip from the arbitrary datum line passing through the lower springing.

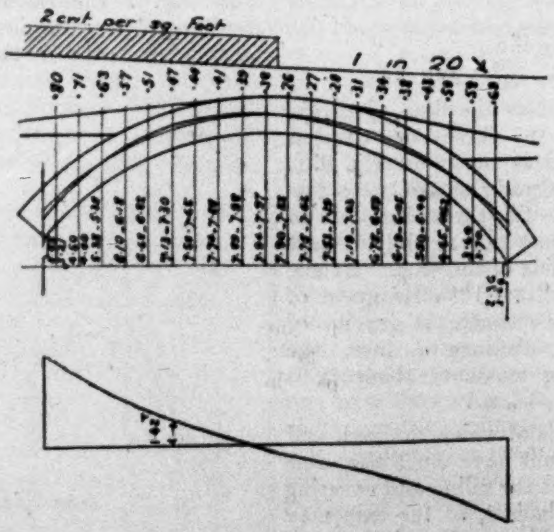


Fig. 4.

Having the shear, that is, the reaction, at the left abutment and the weight of each strip, it is easy to complete the shear diagram, which is given under the profile of the arch.

The point in the span where the thrust line departs most from the centre line of the arch is at the sixth strip from the left abutment where it is ·17 ft., and therefore just within the middle sixth of the arch ring.

The bending moment at this point is therefore ·17 × 4·30 = ·73 foot-tons, and the stress due to bending ·73 ÷ ($\frac{1}{6}$ × 1 × 1·87²) = 1·26 tons per square foot. The shear is 1·42 tons, and the resultant thrust therefore $\sqrt{1{\cdot}42^2 + 4{\cdot}30^2} = 4{\cdot}52$ tons, giving an average stress on the section of 4·52 ÷ (1·87 × 1) = 2·42 tons per square foot. At the extrados the net compression will be 2·42 + 1·26 = 3·68 tons per square foot.

At the left abutment the thrust line is ·24 ft. below the centre line, and the bending moment ·24 × 4·30 = 1·03 foot-tons, producing a maximum stress due to bending of 1·03 ÷ ($\frac{1}{6}$ × 1 × 1·87²) = 1·78 tons per square foot.

The resultant thrust at the abutment is $\sqrt{4{\cdot}90^2 + 4{\cdot}30^2} = 6{\cdot}52$ tons, or 3·49 tons per square foot, giving a maximum compression at the soffit of 3·49 + 1·78 = 5·27 tons per square foot.

A skew bridge may be regarded as a square bridge deformed in either one of two ways, namely, in the direction of the span or in the direction of the abutment.

The former is the simpler to apply in cases where the arch is flat and the amount of skew not excessive, and it is only necessary to work on the skew span and a corresponding section of the arch which will be so nearly segmental as to introduce no practical error.

With a semi-arch and especially where there is much skew, it is better to work on a square section, from which the loads can be more readily calculated. But the actual moment of these loads about the abutment is greater than appears on the square section in the ratio of the skew span to the square span, and the horizontal thrust obtained for the square span must be increased in this ratio in order that it may apply to the skew bridge. The reactions at the abutments and the shear at corresponding points remain the same, but in deforming the 1 ft. thickness of the square arch to produce the required skew arch the thickness of the arch normal to the thrust has been decreased in the proportion of square span to skew span, so that in determining the stresses per square foot the section must be decreased accordingly.

The subject of working stresses on brickwork having recently been dealt with in the *Builder*, it is unnecessary to refer to this part of the subject.

In the tests carried out by the Royal Institute of British Architects there referred to, the amount of compression of the piers at various loads was also measured, and it is interesting to note that these are closely proportional to the loads producing them.

This agreement with Hooke's law justifies the assumption which has been made in obtaining the preceding results, namely, that the angle through which any small portion of the arch is bent, due to the compression of the material on the one edge and the elongation of the material on the opposite edge, is proportional to the bending moment.

NOTES.

The Motor Omnibus in London.

AN engineering correspondent of the *Times* assures us in a recent article that all the objections raised against motor omnibuses are remediable, and, in some respects, will be automatically remedied. We quite believe this may ultimately be the case so far as concerns imperfect mechanism resulting in noise, and the dribbling of oil on street pavements. Vibration, partly due to mechanical defects and partly to excessive speed, is both unnecessary and costly to the owners. Consequently, that objection also is likely to disappear, or, at any rate, to be considerably reduced. But we cannot see the possibility of any effective remedy for the objectionable nature of the exhaust gases from internal combustion motors. However skilful a driver may be, and however perfect future methods of lubrication, the burning of hydrocarbon vapour cannot result in the production of gases that are fit for regular consumption. It is possible that we might in time acquire a taste for and begin to enjoy the flavour of petrol fumes. Nevertheless, acquired tastes are not always beneficial from the physiological standpoint, and it may well be doubted whether the exhaust gases of petrol motor vehicles will ever be so changed in character as to aid the human lungs in performing their vitally important functions.

Street Lighting in the City.

THE official report by Mr. Voysey on the recent experiments made in lighting the streets of the City of London is important, as he draws his conclusions from the results obtained by many careful experiments. One of his conclusions is that by using "flame arc" and "metallic filament" lamp lighting throughout the City streets the illumination could be doubled, and a saving of 30 per cent. on the total annual cost effected. He also states that the experimental results confirm the conclusion at which he had arrived three years ago, that "light for light high-pressure gas incandescent light costs four times as much as the flame arc light." The fundamental proposition on which he bases his conclusions is that the illumination on a horizontal surface 4 ft. from the ground may be taken as the test of street lighting, and that this illumination should not be less than about the tenth of a candle foot, which is approximately that produced by a candle at a distance of one yard, at the darkest portion of the street. He has found that this illumination can be secured by flame arc lamps placed on standards as in Holborn Viaduct at a height of 20·5 ft. from the ground, or centrally hung, as in Cannon-street, at a height of 28 ft. above the ground. It seems to us that the Report is open to criticism on several points. To spend 8,750*l.* on flame arc lamps at the present time seems decidedly risky, owing to the rapid improvements that are being made in the methods of converting electricity into light. According to Professor Steinmetz, the magnetite arc lamp gives a much whiter light, and has an efficiency quite as great as that of the carbon flame arc. It is true that the magnetite arc is not yet on the market, but we know that it has been steadily perfected during the last three years in the laboratories of the General Electric Company of America, and that all the serious difficulties have been overcome. The ordinary yellow flame carbon arc, with its irregular spectrum, seems to us to be only a temporary expedient. The author should have considered the question of the colour of the light more fully. We are in entire agreement with him as to the unsatisfactory appearance of many street lamp standards. The design of a large street standard wants considerable artistic ability, which apparently is often lacking in the drawing office of the ironfounder.

The Utilisation of Blast Furnace Slag.

ACCORDING to recent statistics, the world's production of blast furnace slag amounted last year to 50 million tons, representing a mound containing 1,000 million cubic feet, or a cubic block measuring 1,000 ft. in each direction. It certainly is most desirable that every encouragement should be given to those who seek for suitable means of utilising the vast quantities of slag that are produced every year. Our readers are directly concerned in this matter, if only for the reason that the profitable employment of by-products tends to reduce the price of the main products to which their origin is due. A paper by the Chevalier de Schwarz read before the Iron and Steel Institute gives an account of various methods of employing slag for making bricks with and without the addition of lime or cement. An even more important use is in the manufacture of slag cement, a product which, when carefully prepared, gives excellent results, and, as the author says, has been employed for bridges, buildings, fortifications, and marine structures for the last fifteen years without showing signs of deterioration. While cement of the kind may be quite suitable for some purposes, it must be remembered that the composition and properties of slag are extremely variable, and that, in consequence, slag cement should not be generally employed except under expert advice and subject to the rigid examination of every delivery.

Austrian Navigable Waterways.

AT the present time it is interesting to note that a Commission of International Experts selected by the Minister of Commerce have reported favourably on the remunerative character and technical details of the project already sanctioned by the Reichsrath for the extension and improvement of navigable waterways in the Austrian Empire. Two important points settled by the Commission were that sufficient supplies of water are available for feeding the Danube-Oder and the Oder-Vistula canals, and that in the section of the former waterway where summit level will be attained a chain of locks is preferable to canal lifts of any type. A wise decision is to the effect that the locks shall be of ample

width, thereby providing for the passage of the broad-beamed vessels used on the Elbe, with which the Danube-Oder canal will probably be connected at some future time. Finally, we note that electric traction is recommended for portions of the canal where heavy traffic is likely to be secured. The widespread interest in canal extension on the Continent certainly does not support the theory sometimes advanced in this country that waterborne traffic has seen its day.

Railway Electrification in Bavaria.

A REPORT issued by the Bavarian Government deals at length with the proposed electrification of all the State railways in that country, where so much water-power is available that more than ample supplies can be devoted at minimum cost to the generation of electrical energy. Three central power stations are contemplated as a commencement, from which current will be supplied to main and local lines near the Austrian frontier. The most important of these stations will comprise three separate establishments on the shores of Lake Walchen, with the combined output of 50,000 horse-power. Taking into account the probable increase of traffic, it is estimated that by the year 1920 some 200,000 horse-power will be required, while the maximum demand may ultimately be as much as 600,000 horse-power. Far more than this amount is now running to waste, and only awaits the construction of the works necessary for its conversion. In view of the importance of the undertaking, the Government propose to make the competition for the designs an international matter, and to appoint an international Commission to consider the schemes submitted. We hope that the Commission will set their face against anything likely to disfigure Lake Walchen.

Burke's Home at Beaconsfield.

WE read that Lord Grenfell has acquired the site of the house which Burke occupied during the last twenty-eight years of his life. Burke bought the property, some 600 acres, for 22,500*l.* from the Waller family in 1769. The house, of red brick with stone dressings, and named Butler's Court, was also known as Gregories, after its builder, a London merchant. Burke effected many improvements; he added the wings, and joined them to the main block with curved Corinthian colonnades, taking Buckinghamshire House, St. James's Park, built by Wynde, or Wynne, in 1703, for a model. He commissioned Barry to buy pictures, statues, and other works of art to supplement the large collection he had bought with the estate. That house, where he passed his happiest days, surrounded by his friends and favourite animals, wherein he gave a home to Crabbe, and which evoked Dr. Johnson's encomium, *Non equidem invideo, miror magis*, became a school after his widow's death, and was burned on April 23, 1813. Some mounds of the ruins near the Penn-road, the stables, the gate-piers, and shrubberies, called "Burke's Grove," have remained to our own time. In accordance with his desire, he was buried in the nave of the parish church. A plain mural tablet in the south aisle recorded his death and burial, with those of his beloved son, his wife, and his brother Richard; in 1862 a brass was placed over his grave. The memorial tablet, with an alabaster bust in relievo, executed after his portrait by Reynolds, was set up by public subscription in July, 1898. In the churchyard is the mausoleum, bearing an epitaph by Rymer, of Edmund Waller, the poet. The Wallers lived at Hall Barn, in the parish; the manor passed to them after the suppression of the convent founded at Burnham in 1265 by Henry III.'s brother Richard, Earl of Cornwall and King of the Romans and of Almaigne, whereof the sub-priory in Beaconsfield is represented by the "Old Rectory," lately reinstated for parochial purposes, and, some say, the oldest parsonage house in England (see our "Note" of February 15, 1902).

Abingdon, and St. Helen's Church.

A FUND is opened for the renewal, at an estimated cost of about 1,500*l.*, of the entire external roofs of the five aisles of St. Helen's parish church, Abingdon. The aisles have their origin in the mediæval town guilds; the guild of the Holy Cross, instituted in the church in or before the reign of Richard II., built bridges to replace the dangerous fords at Culhamford and Burford. The embattled tower and lofty spire of St. Helen's form a conspicuous feature of the view as seen from the river and the bridge at Culham. The Saxon name, Seovechesham, or Sewsham, of the town, was changed for Abbendune upon the removal thither from Bagley Wood in 680 of the wealthy and mitred Benedictine Abbey, founded by Cissa, viceroy of Centwine, King of the West Saxons, and his nephew Heane, overlord of Wiltshire. Bagley Wood, 2 miles distant, up the Thames, has been identified with Chiswell Farm near Foxcomb Hill. Dugdale records that Abingdon was a town of some importance, and had a royal residence in the times of the Britons, and that Nicholas de Culham, Abbot in 1289-1307, built the parish church of St. Nicholas. Eighty years after its destruction by the Danes the abbey was reinstated by King Edred (or Edwy), at Dunstan's instigation, who made Ethelwold, Bishop of Winchester, its abbot. In the course of the XIIth century were erected the central tower, nave, and west front of the great church of St. Mary. Of the church and monastic buildings nearly all has disappeared, with the exception of the fish-house, the gate-house, and the mill on the river. In our number of November 4, 1899, we published illustrations, from photographs, of the crypt beneath the Prior's room, the XIIIth-century chimney of the fire-place in that room, the south front (in part), and the interior of the upper story of the XVth century building, all of which were leased by the Corporation and, as far as possible, rendered structurally sound and weather-proof under the advice and directions of the late J. J. Stevenson and Mr. Harry Redfern.

MASONRY WORK IN ZERO WEATHER

By T. B. KIDNER.

IN the colder parts of the Continent of North America, as in Great Britain, building operations in masonry or brickwork are generally suspended during the winter months. In some special cases, however, and by means of elaborate precautions, the erection of structures of masonry is carried on during the depth of the winter in temperatures as low as 20 deg. to 30 deg. *below zero* (Fahrenheit).

To an Englishman, trained in "old country" methods and used to seeing all brick or stone setting cease during the comparatively slight frosts of an English winter, the spectacle of masons at work laying stones in weather when the ordinary pedestrian has much ado to keep himself from being frost-bitten on nose or cheek, is somewhat amazing. A brief account of the methods by means of which masonry work is safely carried on in such weather will doubtless, therefore, be of interest to many of the readers of this journal who, like the writer, were trained in more temperate climes.

The Canadian Province of New Brunswick is intersected in almost all directions by numerous streams and rivers, necessitating the erection and upkeeping of a large number of bridges by the Provincial Government. Covered as it was (and is still, largely) with magnificent forests of pine, spruce, birch, and other timbers, these bridges were

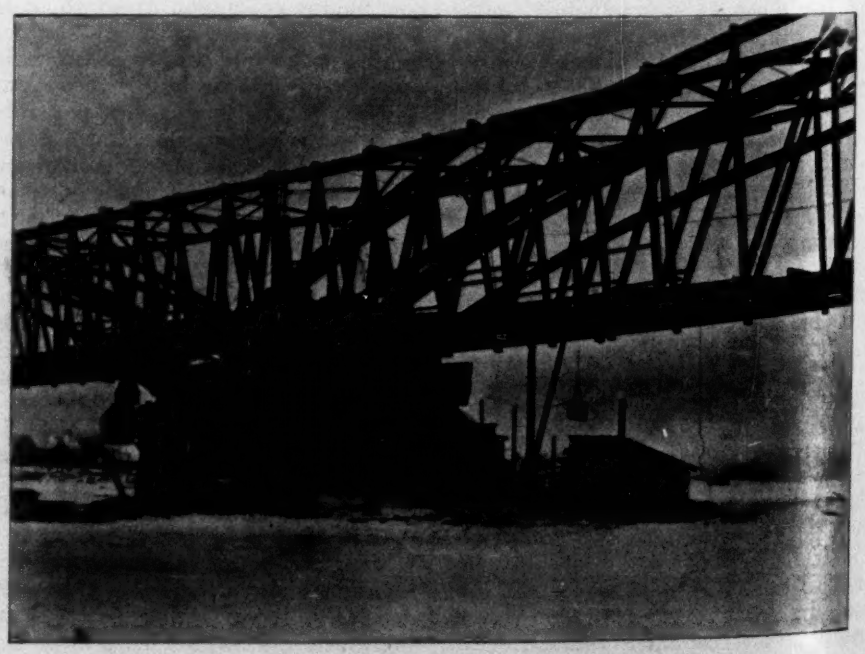


Fig. 1. New Granite Pier and Old "Cribwork" Pier.

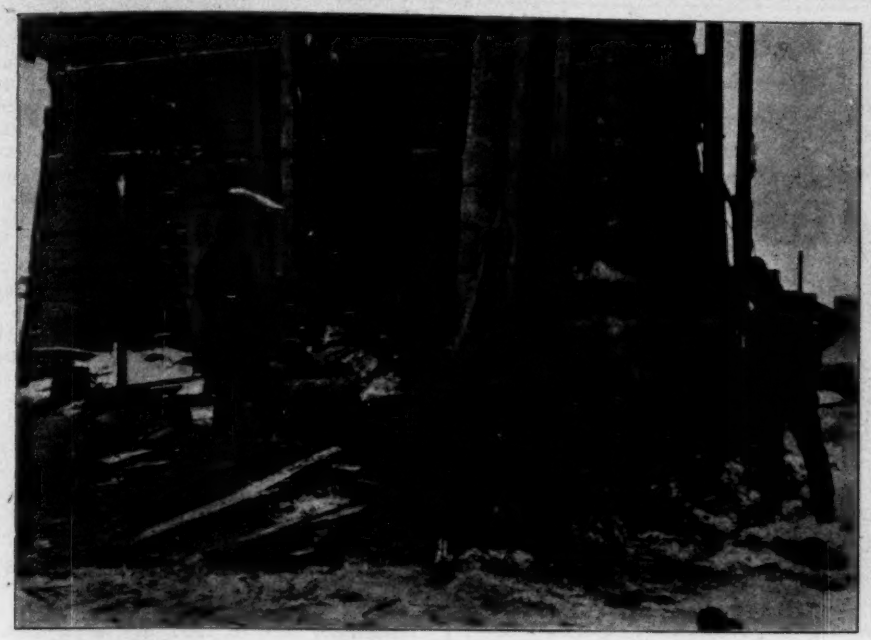


Fig. 2. On the Ice near Base of Pier: Heater for Sand and Cement.

formerly wholly of wood. Many fine specimens of the carpenter's art are still to be seen in daily use; some wooden bridges having spans of over 200 ft. in length. These bridges are supported on piers of "cribwork," which, for the benefit of those not familiar with the term, may be described as a framework of logs, well bolted and spiked together, and filled with heavy stone ballast.

For the past ten or fifteen years, however, the increasing use of steel for structural purposes, and the growing scarcity of heavy timber, have led to the adoption of steel bridges for all large spans. With the passing of the old timber trusses, the old cribwork piers have also been superseded by lighter and smaller ones of granite. The material for these is found in profusion all over New Brunswick, both in the formations of the highlands, and as enormous glacial boulders in the low-lying portions of the province.

For a variety of reasons, some of which are here detailed, it is much more convenient to build these granite piers in the winter than at any other time. In the first place, the rivers are usually frozen until the middle or end of April, and with the breaking-up of the ice the melting of the heavy snow in the woods and watersheds causes tremendous freshets, which often keep the rivers high until well into July. A spell of some two months or so of low water usually ensues, after which the autumn rains again swell the rivers to flood mark. This period of low water is not usually more than sufficient to allow of the preparation of the sites for the piers, which is done by driving piles in the usual way and cutting them off at a uniform level close to the bed of the river.

In the second place, traffic is not interrupted in the winter, the ice forming a safe and convenient bridge for the heaviest vehicles and goods. In fact, even when no repairs are being made to highway bridges, it is customary to close them and divert the traffic to the ice, thus saving wear and tear on the bridges for some four months of every year. At the time of writing (April 24, 1908) the ice bridge on the St. John River (here half a mile wide) in front of the writer's residence is still holding, and teams with heavy loads were crossing within a day or two.

A third factor is that the ice also affords a very cheap and ready means of hauling the materials to the site of the piers. Last winter the writer measured the thickness of the ice near the piers shown in the illustrations, and found 34 in. of clear, blue ice in addition to the snowy, loose portion of its surface. Such a thickness will bear enormous loads, and with the easiest traction imaginable, a horse being able to haul from three to four times as much on runners on ice as on wheels on an ordinary road.

With these and other minor considerations all pointing to the winter as the most convenient time for renewing bridges and erecting the necessary piers, the problem of the latter is wholly one of frost *versus* cement. This is solved as will be described later, and to the complete satisfaction of the exacting and experienced designers of these structures—the engineers of the Government Public Works Department.

After the piles are driven and cut off level the interstices between them are filled with hydraulic cement, and the lowest courses of the pier laid either by means of a cofferdam (in shallow waters) or, more generally, in a heavy timber caisson, which is moored over the site and sunk into position by the weight of the courses. The operation of laying these courses presents, of course, no difficulty in mild weather, but in the cold of a New Brunswick winter it calls for special and peculiar precautions, which the accompanying photographs may serve to illustrate.

Fig. 1 is a general view showing a new granite pier being erected alongside of an old cribwork pier, which is carrying the ends of two large timber truss spans.

Fig. 2 is a nearer view of the work, and shows the old and new piers in detail, but is chiefly interesting from the view it gives of the oven or heater, a simple affair of heavy sheet iron, which forms an important part of the outfit. As may be seen in the illustration, the oven is in the form of a semi-cylinder, and upon it is heaped the sand and cement after being mixed in proper proportions. After a time the mass becomes thoroughly heated throughout, and is then mixed with hot water in small quantities as required, and used in bedding and jointing the granite blocks.

But the intense cold of the blocks would turn the mortar instantly into solid slabs unless the stones themselves were also warmed. Fig. 3 shows how this is done; a large block of granite being shown in the act of being lowered into a tank of boiling water, in which it is immersed until thoroughly heated, when it is hoisted into position and set in the hot cement mortar described above. The tank itself is a heavy structure of deals, well caulked in the joints, and supplied with steam from a boiler within the rough shack shown in Figs. 1 and 3. The bed and side joints upon which the blocks are to be laid are also well warmed by directing a jet of live steam upon them for some minutes before applying the mortar.

The effect of these precautions is that the chemical action of setting is well advanced before the stones cool, and no failures from subsequent frost have been observed, nor have repeated tests of cement set under these conditions shown any weakness or deterioration.

Fig. 4 is a near view of the masons at work on the top course, or "bridge seat" of the pier; the floor beams and bottom chords of the old timber span having been cut to allow of the pier being finished.

The photographs were taken between 10 and 11 a.m. on February 4 last, the thermometer at the time registering 12 deg. below zero, and having stood at 30 deg. below at daybreak of the same day. It may be thought almost impossible for men to work in such intense cold, but the air is dry, and the brilliant sunshine and bright blue skies, four days out of five, are healthful and invigorating, and the cold is not at all as unpleasant as may be imagined. Of course it would be idle to pretend that the masons and their helpers do not feel the cold, but the pay is good, and the contractors do all that they can for the men's comfort by erecting windbreaks to screen off the biting blasts which sometimes, but not often, accompany very low temperatures in this part of the world.

[The writer of the above interesting

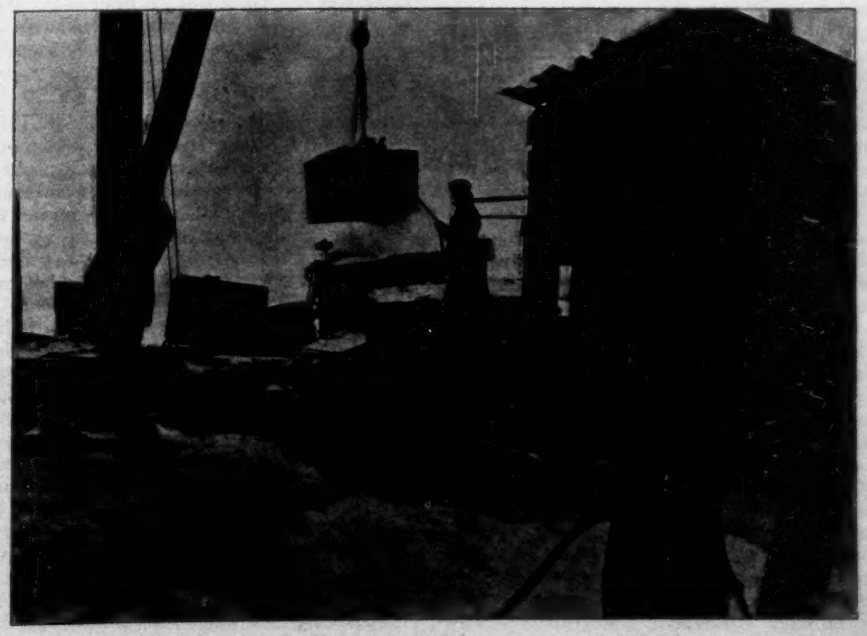


Fig. 3. Lowering Stone into Tank of Boiling Water, Previous to Setting.

Fig. 4. Laying the Stones in Pier.

communication is Director of the Manual Training and Household Science School in connexion with the Education Department of New Brunswick. The photographs were taken by himself.—ED.]

NOTES FROM PARIS.

THE newly elected Municipal Council of Paris, which met on the 10th, will have during its four years of office some important public works on which to employ its energies, and which it is hoped will be undertaken during the present Council's term of office. The most important of these is the completion of the Boulevard Haussmann. Among the operations proposed by the Prefect of the Seine, one of the minor schemes (which has nevertheless a special artistic and historic interest) is the enlargement of the Carnavalet Museum, for which M. Foucault, the architect, has prepared plans which will double the accommodation for the collections illustrating the history of Paris, while it will also have the advantage of isolating the Museum buildings, which are at present in dangerous proximity to certain chemical and other factories.

Another subject with which the Council will have to deal is the long-intended removal of the fortifications. The Government, which is the proprietor of the land, wishes to sell it to the Corporation at a price of 90 million francs, which sum the City authorities consider a great deal too high. What is feared is that in the end building speculators will have the better hand over the "hygienistes," and that instead of the open spaces which it was hoped would be substituted for the fortifications, Paris will be imprisoned with a circle of houses and business buildings.

Dalou's great group of the Triomph of the Republic in the Place de la Nation will shortly be completed by the addition of the animal figures which the sculptor intended, and which have been commissioned by M. Georges Gardet. They will form a series of fountains surrounding the principal group. Dalou had himself made sketches for these additional details, but his death prevented their completion by his own hand.

Paris has for some days been in possession of a new museum, installed in the Hotel de l'Avenue du Bois de Boulogne. This museum, in illustration of Chinese and Japanese art, has been very well arranged by the curator, M. Deshays, a learned man in Oriental art, who was formerly attached to Guimet Museum. Unfortunately however, the collection itself is not of very high interest. There has also been opened a new room in the Guimet Museum of Oriental Art, containing the collections of M. Gayet.

A monument has just been inaugurated at the entry to the Avenue de Villiers, to the memory of Henri Becque the dramatist, notable as the work of an eminent architect and an eminent sculptor—M. Nénot and M. Rodin, whose names may be said to be a good deal more celebrated than that of the subject of the monument.

M. André Michel, the art critic, has been elected President of the "Société de l'Histoire et l'Art," which has published many most valuable works on the history of French art. M. Gustave Geffroy has been appointed Director of the Manufactory of the Gobelins, in place of M. Guiffrey.

M. Girault, the eminent architect of the Petit Palais, and M. Bartholomé, the sculptor, have been appointed members of the Jury commissioned by the City of Geneva to decide the competition for the monument to Calvin and the Reformation.

The death is announced of M. F. Liger, a former "architecte-voyer" to the City of Paris, who has left a legacy of more than 2 million francs to the Department of La Sarthe, where he had lived for the latter years of his life. To the town of Mans he has left a library of 2,000 volumes, a large collection of coins, and a whole museum of ancient furniture, tapestries, and metal-work. M. Liger was the author of an interesting work on "Ferronnerie—Ancienne et Moderne."

THE HOUSING PROBLEM.

IN the *National Review* Mr. F. B. Behr, the inventor of the Behr high-speed monorail system, deals with the housing problem in connexion with means of transportation. We fear the writer rather under-estimates the value of existing and projected railways and tramways, which have done much and promise to do much more to facilitate access between the outskirts and the business areas of London. But we readily admit the desirability of establishing in country districts colonies for working-men, mechanics, clerks, and others; and the proposition that it would be a good thing if the dwellers in garden suburbs twenty or thirty miles from town could be carried to and from work in from fifteen to twenty minutes. Mr. Behr proposes that this should be done by the aid of his railway system, permitting trains to be run at 110 miles an hour. So far as engineering details are concerned there is no difficulty, and the safety of the system is sufficiently vouched by the facts that Parliament has authorised the construction of such a line between Manchester and Liverpool, and that the plans were approved by the Board of Trade. To illustrate his proposals, Mr. Behr assumes the establishment of a new suburb at the distance of twenty miles from the Mansion House, the settlement to include two centres—one for mechanics and the other for clerks—and to be served by a railway with two country stations and a terminus in London. Express trains at intervals of two minutes would run from one station between 6 a.m. and 8 a.m., and from the other station between 8 a.m. and 10 a.m., the journeys occupying thirteen minutes and fourteen minutes respectively.

It is unnecessary to discuss the figures by which Mr. Behr demonstrates the commercial success of the settlement and the railway, for no doubt both of them could be made to pay. As the writer suggests that "the capital required to carry out these schemes would be found easily by private subscription," our advice is that he should set to work at once and get the first colony and railway started without delay. Considered on its merits the scheme is quite practicable, but provision would certainly have to be made for local traffic between intermediate stations after the morning rush to town and before the evening exodus. Probably also many of the residents would not wish to be carried right into the heart of the City. Consequently, it might be necessary to double the width of the railway so as to provide duplicate lines for express and stopping trains. This would mean a considerable addition to the initial outlay, and as the figures quoted by Mr. Behr already involve an expenditure of nearly four and a half millions, it is evident that a good deal of hard work will have to be done before anything practical can be accomplished, notwithstanding the assumed readiness of private persons to lend their money for any important public object.

NEW GENERAL POST OFFICE BUILDINGS:

TEST OF A REINFORCED CONCRETE FLOOR.

A TEST of reinforced concrete construction at which we were present was conducted a few days ago in the new Public Office building of the General Post Office extension by Messrs. L. G. Mouchel & Partners, the consulting engineers responsible with Sir Henry Tanner for the design and execution of the work.

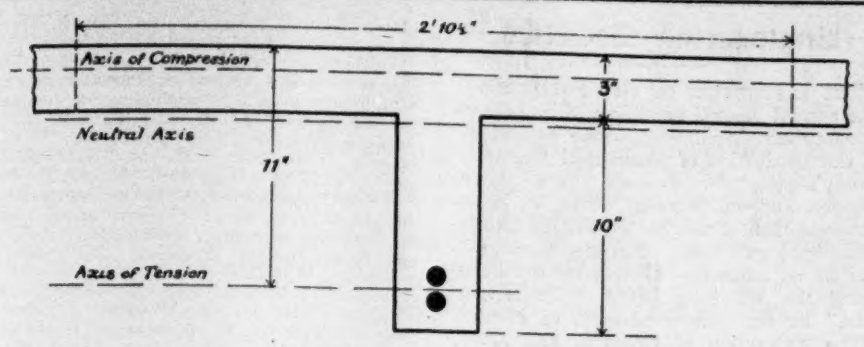
The area selected for test formed part of the first floor, measuring 17 ft. by 2 ft. 10½ in., and carried by one of the secondary beams with the clear span of 16 ft. 10 in. in the width of 4 in. and the depth of 10 in. below the 3-in. floor slab, making up the total depth of 13 in.

Soon after 11 a.m. the floor was loaded with gravel filled into a timber frame to the extent of 84 lb. per square foot, that being the normal working load for which the floor was designed. An instrument graduated in 64ths of an inch placed below the middle of the supporting beam showed that the deflection under normal loading was so small as to be scarcely appreciable.

The load was then increased to 126 lb. per square foot or 50 per cent. above the normal load, with the result that the maximum deflection reached no more than $\frac{1}{256}$ in.

More gravel was next added until the load became 168 lb. per square foot, or double the normal load, the maximum deflection then being only $\frac{1}{128}$ in., or $\frac{1}{15836}$ of the span, as compared with the proportionate deflection of $\frac{1}{600}$ permitted by the terms of the specification.

The exceedingly small effect produced is a sufficient guarantee of the very ample strength and rigidity possessed by the floor in question, and as on removal of the load the beam immediately regained its original form the perfect elasticity of the construction was satisfactorily demonstrated. The result of this test also speaks well for the quality of the materials and workmanship.



In order that our readers may be enabled to calculate for themselves the resistance of the beam, we give in the accompanying figure a section of the floor area tested, including only the tension reinforcement of the beam, which consists of two $\frac{7}{8}$ in. diameter bars of mild steel with the tensile strength of from 28 tons to 32 tons per square inch.

The concrete was mixed in the proportions of 6 cwt. of Portland cement, 13½ cubic ft. of clean, sharp sand, and 27 cubic ft. of washed Thames ballast crushed to pass through a ¾-in. diameter gauge.

The following calculations have been made by the formulæ in Article XVII. of our present Student's Column, the floor area being regarded as a T-beam with single reinforcement.

Area of tension reinforcement $= 2 \times (\frac{7}{8})^2 \times \cdot 7854 = 1{\cdot}75$ sq. in., whence $\rho = 1{\cdot}75 \div (4 \times 11) = 0{\cdot}04$.

Proportionate depth of flange, $v = 3 \div 11 = 0{\cdot}272$.

By formula (52), $x = 0{\cdot}312$, and taking as a basis the tensile stress in the reinforcement t_s = 15,000 lb. per square inch, we get by formula (49) for the compressive stress in the concrete c_c = 453 lb. per square inch.

Then by (53) and (54) the safe moment of resistance works out to 262,000 inch-pounds, without allowing anything for the resistance contributed by the reinforcement in the floor slab.

Let us now compare this result with the maximum bending moment of the beam.

Dead load of the reinforced concrete at 150 lb. per cubic foot.

$$150\ [(34{\cdot}5 \times 3 \times 202) + (4 \times 10)] = 2250 \text{ lb.}$$

Superload of 84 lb. per square foot.

$$84 \left(\frac{34{\cdot}5 \times 202}{144}\right) = 4060 \text{ lb.}$$

Total load = 6310 lb.

As the beam is fixed at each end, we have by the usual rule for the maximum bending moment

$$M_b = \frac{6310 \times 202}{10} = 127{,}500 \text{ inch-pounds.}$$

Therefore the floor area tested is capable of supporting more than double the load for which the specification provides without exceeding the customary safe working stresses in the concrete and reinforcement.

We are very glad to find this evidence of conservative design in connexion with the new Post Office buildings, and hope that the same prudence may be universally exercised by all who apply reinforced concrete in building construction.

Floors are frequently called upon after completion to sustain greater weights than those represented by the bare specification loads; consequently, unless there is an ample reserve strength ominous cracks may appear, and if things are cut too fine there will be risk of serious failures from which we have fortunately been exempt so far in this country.

CLOCK TOWER, TIVERTON.—A clock tower has been erected in this borough at Lowman Green. It was designed by Mr. J. Donkin, architect, of Bournemouth. The builder was Mr. F. Stemson. On the corner abutments are figures of "Faith," "Hope," and "Charity," these, with other ornamental carved work on the fabric, being the work of Messrs. Harry Hems & Sons, of Exeter. The cost was 1,000*l.*, exclusive of the site.

PICTURE EXHIBITIONS.

THE CARFAX GALLERY.

THE exhibition at the Carfax Gallery of a collection of water-colours by Mr. Sargent has naturally excited a good deal of interest. They are for the most part very rough work, rather artist's memoranda than pictures, but Mr. Sargent's extraordinary power of indicating with a few broad touches or splashes all that he wants to indicate, and his mastery of colour, put these quite out of the category of ordinary sketches. The Fountain at Villa Castello, which has been before seen at the Society of Water-Colours, we said at the time was the most remarkable work in the room; the sketch of a white ship's hull "In a Levantine Port," which was at the New English Art Club some little time since, is almost equally remarkable. When, however, it appeared that Mr. Sargent was disposed to take up architectural subjects, the two or three brilliant and splendid sketches of this class which he first exhibited led us to expect something better than some of the architectural subjects we find at the Carfax Gallery. We do not want to see "The Doge's Palace" and the Library reduced to a mere almost shapeless scumble of half made-out forms. Mr. Sargent has it in his power to be the finest painter of architectural effects we have had; but he is disposed to treat this class of subject in too offhand and careless a manner.

THE LEICESTER GALLERIES.

At one room in the Leicester Galleries is a collection of water-colours by Mr. Mark Fisher, which rather tends to show that he had better keep to oil-painting. He has made a style of his own in oil-painting, remarkable for its vigour and freedom; but in the use of water-colour he is too spotty and wanting in mass of colour; we seem to see through everything, and there is a want of breadth and repose. Only now and then, as in the one called "The Pond," we seem to come again on the Mark Fisher that we know. In the inner room is a collection of very different interest; water-colours "By deceased and living artists," containing a number of works of the highest order. Among the finest are Samuel Palmer's grand drawing of "The Aged Oak"; Alfred Hunt's "Robin Hood's Bay," and Mr. Eyre Walker's "On the Severn": but there are many other things worth attention.

Architectural Societies.

DEVON AND EXETER ARCHITECTURAL SOCIETY.—The twenty-first annual Report of this Society, presented at the annual meeting on April 11, states that the membership has been fairly well maintained, and, after removing the names of fifteen—one by death and the others by resignation and those whose subscriptions were in arrear—the roll of members now stands at eighty-one. The Report states that—

"In January, 1904, Messrs. J. M. Pinn, J. Crocker, and C. Cole, Members of the Council, were appointed a Committee to consider the present by-laws of the city, with the view of suggesting any alterations that may be considered desirable, it being understood that the City Council contemplated issuing new by-laws. The late Town Clerk was communicated with, and intimated that any suggestions from the Society would be considered. The Committee had many meetings, at which the present by-laws were discussed, and suggested certain alterations. The Town Clerk was informed that the Committee were prepared to lay their views before the Council. No intimation, however, was received that this may be done, but the Streets Committee of the City Council had in the meantime prepared draft revised building by-laws, and in July, 1907, sent a copy stating that they would be prepared to hear any comment on them before they were further considered. After this your Committee met several times and examined and discussed the draft revised by-laws, when it was found that some alterations had been made in the present bye-laws in agreement with what your Committee were prepared to suggest. Your Committee thereupon had some interviews with the City Surveyor and laid before him their views, some of which he agreed with and others he did not. He, however, took notes of the whole of your Committee's suggestions with the intention of laying them before and discussing them with the Streets Committee. Your Committee think it should be stated that the City Surveyor received the views put before him with much consideration and gave a good deal of time to discussing the subjects.

Your Council still regret there has been no response from the younger members in connexion with the London Architectural Association, whereby Students of the Society may join the School of Design, therefore the Guinea Book Prize offered by the Society to the competitor whose design is placed first has not been awarded.

Your Council invite an increased attendance of the Associates at their meetings."

The President, in the course of a short closing address, observed that the principal event of the year in the country was the extensive competition for the large block of buildings to be erected by the London County Council on the Thames Embankment, and they would congratulate Mr. Ralph Knott on having gained so important a competition at such an early stage of his career, and in connexion with so many well-known names. This competition seemed to have been won principally by its excellent planning, the elevations not appearing to be absolutely what they might be and wanting in some special feature, but this would probably be put right before the final drawings were decided upon. The importance of a good plan could not be too greatly emphasised, and it never should be allowed to be sacrificed for the sake of an elevation, that being allowed to work out its own ends. On the subject of town planning, coming prominently before the public by the introduction of a Bill in the House, he would venture to say a word or two. They had discussed before in their meetings garden cities and the improvement of approaches to towns by road and rail, but everything that had been done in England up to the present had been done by private enterprise and not under statute law. They in England liked to be free and not tied down as they were on the Continent, but this freedom might be carried too far, and hence their cities developing all around in a haphazard manner without due regard to public convenience. They saw springing up around them miles upon miles of dull and narrow streets, not only without the provision of wide main arteries planted with trees as on the Continent, but without any open spaces for either park or playground, and no provision of sites for public buildings, or manufactories, or workmen's dwellings, and no defined zones for different types of houses. It seemed to him that in the development of large towns there should be some sort of control whereby they could be laid out with due regard to convenience, providing for wide main arteries well planted, more ground around houses as they get further from the centre of the town, different zones for various classes of houses, provision of sites for public buildings, workmen's dwellings, and manufactories, parks, and open spaces. The city of Exeter was happily well provided with trees, gardens, and open spaces, but if their town of Plymouth, with its beautiful situation, had been taken in hand twenty years ago and laid out on a system, they might have had a beautiful place instead of miles of nothing but uninteresting houses. The following officers and Council were elected by ballot for the ensuing year:—President, Mr. J. Crocker, F.R.I.B.A.; vice-president, Mr. W. H. May, M.S.A.; hon. treasurer, Mr. S. Dobell; and to fill vacancies on the Council, Mr. C. J. Tait, F.R.I.B.A., C. Cole, M.S.A., C. Cheverton, and J. C. Southcombe.

The *Proceedings* includes condensed reports

of the papers read during the session; among them "Notes on Reinforced Concrete," by Mr. Charles Cole with two pages of instructive diagrams, and a very good and enthusiastic paper by Mr. James Crocker on the life and works of Sir Charles Barry.

EDINBURGH ARCHITECTURAL ASSOCIATION.—A visit of this Association took place on Saturday last to The Glen, Peebles-shire, permission having been granted by Sir Edward Tennant, Bart. Between thirty and forty members were present. The mansion was built about fifty years ago by the late Sir Charles Tennant from the designs of David Bryce. A few years ago the house was almost totally destroyed by fire, but most of the valuable contents were saved. The reconstruction of the house was recently completed, the architect being Mr. R. S. Lorimer, A.R.S.A. The visitors were conducted over the house and grounds by Mr. Duff, the estate clerk of works. The party were afterwards entertained to tea at the Traquair Arms, Innerleithen, by Mr. Lorimer, to whom a vote of thanks was proposed by Mr. John Watson, F.R.I.B.A.

ULSTER SOCIETY OF ARCHITECTS.—A general meeting of the Ulster Society of Architects was held in the rooms of the Society, 13, Lombard-street, Belfast, on the 29th ult. The President (Mr. W. J. Gilliland, F.R.I.B.A.) occupied the chair. Mr. Lamont, in the absence of the Honorary Secretary, read the minutes of the annual general meeting, and also of an interim special general meeting, which were confirmed. The Council reported the business transacted by them since the annual general meeting. They had co-opted Mr. W. H. Patterson, a member of Council, to fill the vacancy caused by the promotion of Mr. W. J. Gilliland to the presidency and Mr. R. M. Young to the vice-presidency. They had elected the President, the Honorary Secretary (Mr. N. Fitzsimons, A.R.I.B.A.), Mr. J. J. M'Donnell, and Mr. J. St. J. Phillips as representatives on the Joint Art Committee of the Society, the Belfast Art Society, and the Ulster Arts Club. With a view to drawing attention to their case for affiliation with the Royal Institute of British Architects they had induced the Institute to issue ballot papers in the election of all new associates, which meant circularising about 2,000 members, instead of taking a vote of those present at meetings. They were also furthering their claim to affiliation by other means. Mr. Ferguson proposed, Mr. Phillips seconded, and it was unanimously resolved that the Honorary Secretary be instructed to forward a copy of the resolution passed at the annual general meeting *re* the Royal Institute of Architects of Ireland to all members of the Ulster Society who are also members of the R.I.A.I., and to ask what steps they have taken in the matter, as their continued membership of the R.I.A.I. is a serious handicap to the Ulster Society in the more important matter of obtaining affiliation with the R.I.B.A. On the motion of Mr. M'Donnell, seconded by Mr. Ferguson, a resolution was passed congratulating the President (Mr. Gilliland) and his client, Mr. M'Watters, on the result of the recent case of the Belfast Corporation *v.* M'Watters, tried before the Lord Chief Baron. Mr. R. M. Young proposed, Mr. Tulloch seconded, and it was unanimously resolved:—"That any University created for Belfast and the province of Ulster will be incomplete unless provision is made for the establishment of a Chair of Architecture therein, and that it is essential that sufficient funds be provided by the Government to enable the statutory authority of the proposed University to provide such a Chair." Copies of the resolution were directed to be sent to the Chief Secretary and to the members of the House of Commons Committee on the Bill. The last business on the agenda, *re* model plans recently issued by the National Education and Local Government Boards, was postponed to the next general meeting. The proceedings then terminated.

Engineering Societies.

THE INSTITUTION OF GAS ENGINEERS.—The annual general meeting will be held on Tuesday and Wednesday, June 16 and 17, at the Institution of Mechanical Engineers, Storey's-gate, St. James's Park, Westminster, and on Thursday, June 18, in the Congress Hall of the Franco-British Exhibition, Shepherd's Bush. The programme, etc., will be as follows:—Address by the President (Mr. W. Doig Gibb). "Co-partnership," by Sir George Livesey, of London. "The Extraction of Cyanides and Manufacture of Yellow Prussiate, by the Davis-Neill Process at the Linacre Gas Works, Liverpool," by Mr. Edward Allen, of Liverpool. "Refractory Material," by Mr. Frederick J. Bywater, of Birmingham. "Recent Experience with the Dessau Vertical Retorts," by Mr. A. F. P. Hayman, of Berlin. "Description of the New Gas Works at Valby, Copenhagen," by Mr. J. O. V. Irminger, of Copenhagen. "Continuous Carbonisation in Vertical Retorts," by Mr. H. W. Woodall, of Bournemouth. A lecture on "The Combustion and Thermal Decomposition of Hydrocarbons" will be given by Professor William A. Bone, D.Sc., F.R.S., of Leeds, on Wednesday morning, June 17.

PROPOSED NEW BUILDINGS IN LONDON AND SUBURBS.

VILLAS at Barnes. Messrs. Chas. Ellis & Co., builders, 174, Upper Richmond-road, East Sheen, S.W.

New R.C. church and presbytery, Wallington (Surrey). Very Rev. Canon Cafferata, Rector, Our Lady's Church, Sutton.

Development of 60 acres of land for building at Golder's Green. Hon. Wm. H. Appleton.

Shops at Barnes. Mr. F. W. Dunkley, agent, Church-road, Barnes.

Buildings in Kingsway, W.C. Messrs. James Smith & Sons, builders, South Norwood.

Additions to works in Roden-street for Ilford, Ltd., Ilford.

Empire Theatre of Varieties, Kilburn. Messrs. T. H. Kingerlee & Sons, builders.

Development of building estate at Castlenau, Barnes. Messrs. M. Thacker & Co., contractors, 53, Victoria-street, S.W.

Buildings in Kingsway, W.C. Messrs. Barlow & Roberts, builders, 14, Red Cross-street, S.E.

Shops, etc., in Broad-street, W.C. Mr. F. G. Minter, builder, Putney, S.W.

Rebuilding "Black Dog" public-house, Shoe-lane, E.C. Messrs. Rice & Son, builders, Stockwell-road, S.W.

Ninety-seven houses, Ilford. Mr. L. Verlyck, architect, Adelaide-chambers, Ilford.

Stable for South Essex Laundry Company, Ltd., Roden-street, Ilford.

Proposed technical institute and proposed mixed school at Guildford, for Education Committee, Mr. F. S. Tosswill, secretary.

Southgate.—Six houses, Mr. W. J. Edwards, "Langdale," Woodside-grove, Finchley; proposed additional office accommodation for Urban District Council, Mr. C. G. Lawson, Urban District Surveyor; six houses, Mr. G. C. E. Matthews; three houses, Mr. E. J. Smee; twelve houses, Bounds Green, Mr. A. Garrett; laying out two new streets, Old Park Grange Estate, Winchmore Hill, Messrs. Metherell & Son.

Finchley.—Additions to Wesleyan chapel and new Sunday-school, ten houses and shop, Regent's Park-road, and four houses, Great North-road, Mr. C. F. Day, builder, 21, Regent's-parade, Finchley; two houses, Arden-road, Mr. C. W. Scott, builder, Church End Station, N.W.; eighteen houses, Mr. J. E. Hattersley; four houses, Windsor-road, Mr. A. E. Bailey.

Croydon.—Twelve houses, Blackhorse-lane, Mr. S. Nixon, surveyor, 11, Buckleigh-road, S.W.; nine houses, Mr. E. Bates, architect, 2, Imperial-buildings, Croydon; ten houses, Broad Green-avenue, Mr. C. A. Sedgewick, builder, Frant-road, Thornton Heath; six houses, Mr. H. S. O'Reilly; two houses, Mr. W. Fear.

Harrow.—Eight houses, Dorset-road, Mr. J. Emes; proposed offices in Northolt-road for Harrow and Stanmore Gas Company; two houses, Mr. W. H. Watts; shop and workshop in Wealdstone for Messrs. Freeman, Hardy, & Willis, Ltd., Newington Butts, S.E.

Buildings in Norbury. Messrs. L. Whitehead & Co., Ltd., builders, Portland-place North, South Lambeth.

Proposed new Congregational church, Goodmayes (Essex). Rev. Davis Bull, minister.

Wimbledon. — Thirty-three houses, The Crescent, Messrs. Ryan & Penfold, agents, Wimbledon Park; enlargement of cottage hospital (2,500*l.*), Mr. A. Steele Sheldon, Town Clerk, Wimbledon; thirty-five houses, Mr. C. Barwell, "The Elms," Morden, Wimbledon; laundry in Merton High-street, Messrs. Hooker & Webb, 4, High-street, Croydon; new church and parish-room, Mr. T. G Jackson, architect, 14, Buckingham-street, Strand, W.C.; shops and flats, Messrs. Thompson & Pomeroy, architects, Hill-road, Wimbledon; shop and showroom in Worple-road, and conversion of premises into shops, Messrs. Whitehead Brothers, builders, 21, Wimbledon Hill-road; alterations and additions to building, Wimbledon Common, Mr. R. A. Hinds, architect, Wood Nook, Wimbledon Hill.

Barnet.—Iron schoolroom, Stapylton-road, Rev. Francis Spink; road between Normandy and Bedford avenues, Messrs. Sparrow & Son, agents, Finchley.

Illustrations.

INTERIOR, NORWICH UNION LIFE ASSURANCE SOCIETY'S BUILDINGS.

WE published in our issue of July 7, 1906, the exterior view and the plans of this building, accompanied by a full description.

The large room, of which a view is here shown, forms the centre of the plan, out of which, behind a colonnaded screen, the minor offices open.

The drawing was exhibited at the Royal Academy of 1906, under the name of Mr. G. J. Skipper only, which we have therefore followed in the title in this case, though the illustrations of the exterior and plans were given in the name of the firm—Messrs. G. J. & F. W. Skipper.

NEW EMPIRE THEATRE, SUNDERLAND.

THE site for this theatre is an ideal one, being in the busiest part of Sunderland, and one block removed from the High-street. It has, however, an approach from the High-street, used for the approaches to the circle and stalls.

The dimensions of the auditorium are 82 ft. wide by 80 ft. long. The stage is 72 ft. wide by 42 ft. in depth, with large property rooms attached. The floor of the house is occupied by stalls and pit, and there are three tiers above consisting of dress circle, balcony, and gallery, the total seating accommodation being nearly 3,000.

The approach from High-street to the dress circle is in the first instance through a circular vestibule 19 ft. in diameter, lined with marble and alabaster, and decorated above in fibrous plaster Corinthian pilasters and enriched cornice, surmounted by a dome with moulded ribs and balustrade; the panels between pilasters are fitted with painted figure subjects of well-known dramatists and musicians.

The grand staircase is carried out in terrazzo, with alabaster and marble wall linings, and with fibrous plaster barrel dome ceiling, divided by moulded beams into panels. The walls are decorated with Corinthian pilasters and cornices, and panelled and fitted with silk tekko, and the mouldings and ornaments gilded.

The waiting halls for the circle are a feature of the building, being most luxurious and having a total length of 112 ft. They have circular recesses, fitted with seats and lounges for those waiting for the second performance. The crush hall is 23 ft. by 13 ft., and opens on to the waiting halls and the exit for the first house, and on to a buffet with an island counter and fittings, all of mahogany. The stalls are approached by altogether independent corridors from the front entrance, with exits to the rear of the building.

The staircases to upper tiers are in short flights of seven or eight steps, with square brick newels with rounded angles, and are of concrete. The whole of the tiers are in

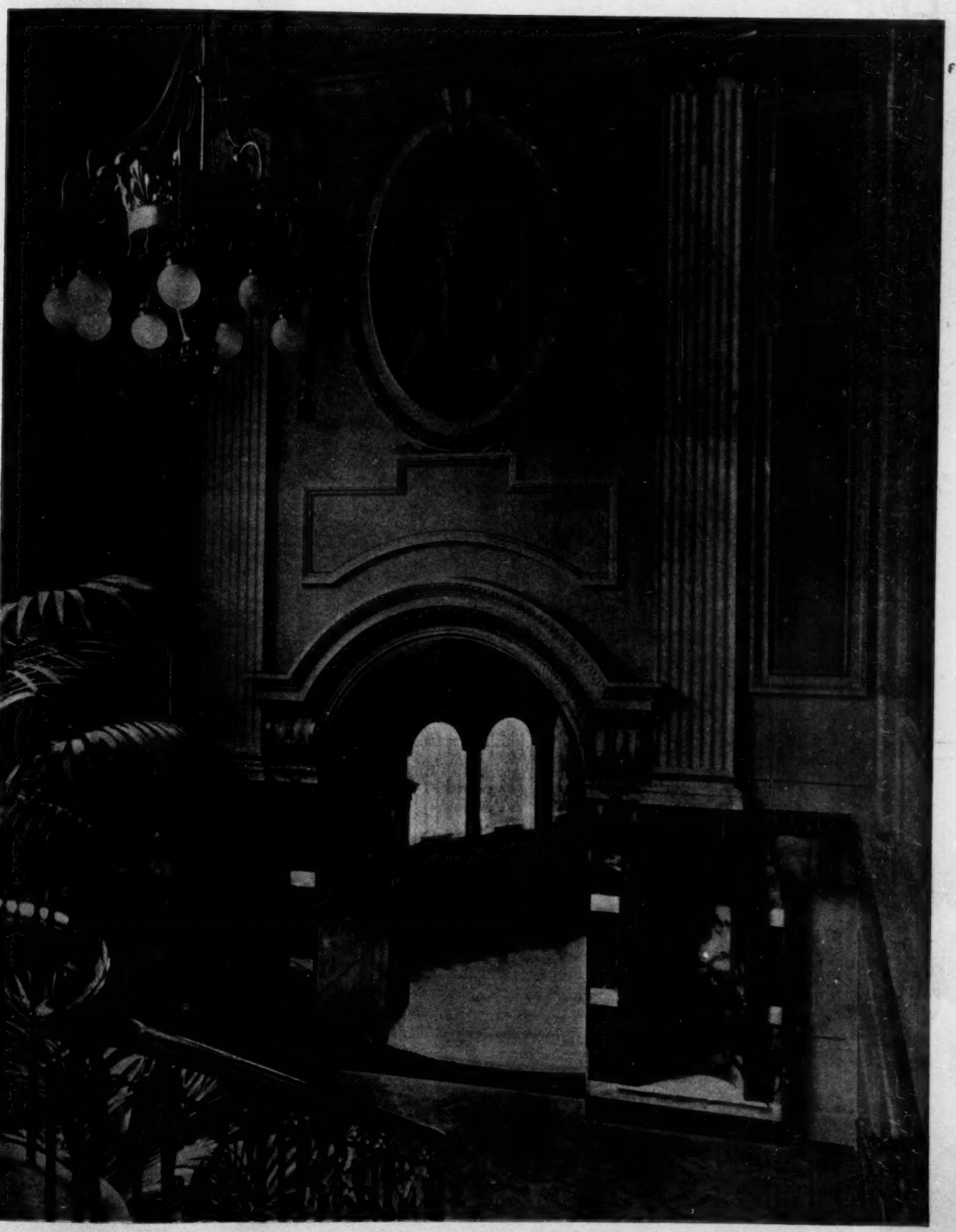
concrete from 3 in. to 6 in. thick, having expanded metal in risers and treads. These rest on light girders fitted in between the cantilevers and steel joists. The main girders rest on three solid steel columns, only one of which is visible from the auditorium. The rakers are of steel, resting on walls bracketed and bolted to main beams, and some of them are carried right from the main girders to form cantilevers.

In entering the auditorium from any portion of the house the principal object that attracts the eye is the sloping sides, where the boxes in a theatre are usually situated. Instead of these boxes, the circle steppings are continued in a sweep almost to the stage level, each tier being fitted with seats. This presents a marked diversion from the usual run of theatre work, and gives an open appearance to the house. The seats also in this tier have an excellent view of the stage, and are found to be favourite positions with regular patrons of the theatre. At the back of the circle are six ordinary boxes, approached direct from the crush room, with a bioscope box in the middle, the whole of these and other parts of the building being in patent fireproof partitions.

The whole of the roofs of the auditorium and staircases are of concrete, and the stage is fitted with concrete flies. The stage is shut off entirely from both dressing-rooms and auditorium by fireproof doors, and, of course, an asbestos fireproof curtain. There are sixteen dressing-rooms, all fireproof, and approached by cement staircases.

The whole of the stalls and circle are fitted with tip-up seats, and the pit and balcony with upholstered and fixed arm seats.

The stone circular tower at the corner of High-street rises to a height of 90 ft., and is surmounted by a copper dome and revolving



Empire Theatre, Sunderland: Staircase Hall.

sign worked by an electric motor, with the words "Empire" illuminated by electric lights, and above this again is a copper figure representing "Success."

There are waiting halls provided to every section of the house, with lavatory accommodation for each sex, and also buffets to all parts with the exception of gallery.

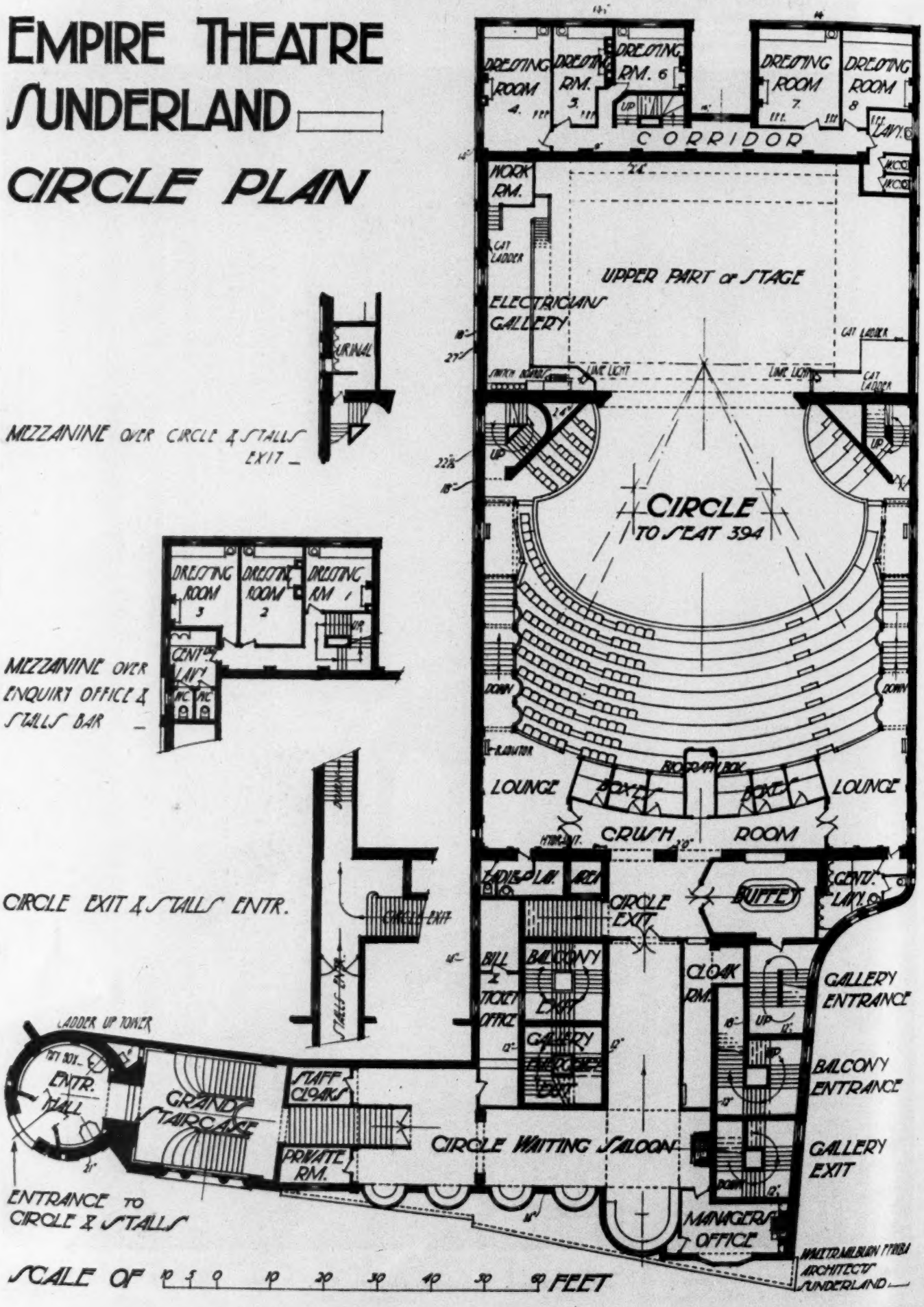
The ceiling of the auditorium is surmounted by a large circular dome, which rises 10 ft. above the level of the ceiling, and is ornamented with fibrous columns and pillars with domed top, a balustrade running between the columns.

The walls of the auditorium are treated with pilasters and divided up into panels, the larger panels having painted figure studies stretched on canvas, the smaller panels being fitted with silk tekko.

The cost of the building has worked out, inclusive of all decorations, upholstering, electric installation, stage equipment, draperies, and buffet fittings, at 31,000*l.*, of which sum about 24,000*l.* is represented by the actual building and plain plastering.

The following were the contractors:—

Mr. J. W. White (Sunderland)—General contractor.
Messrs. Drew-Bear Perks (London)—Constructional steelwork.
Messrs. John Rule, Ltd. (Sunderland)—General plastering work.



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F.R.I.B.A., Architect.

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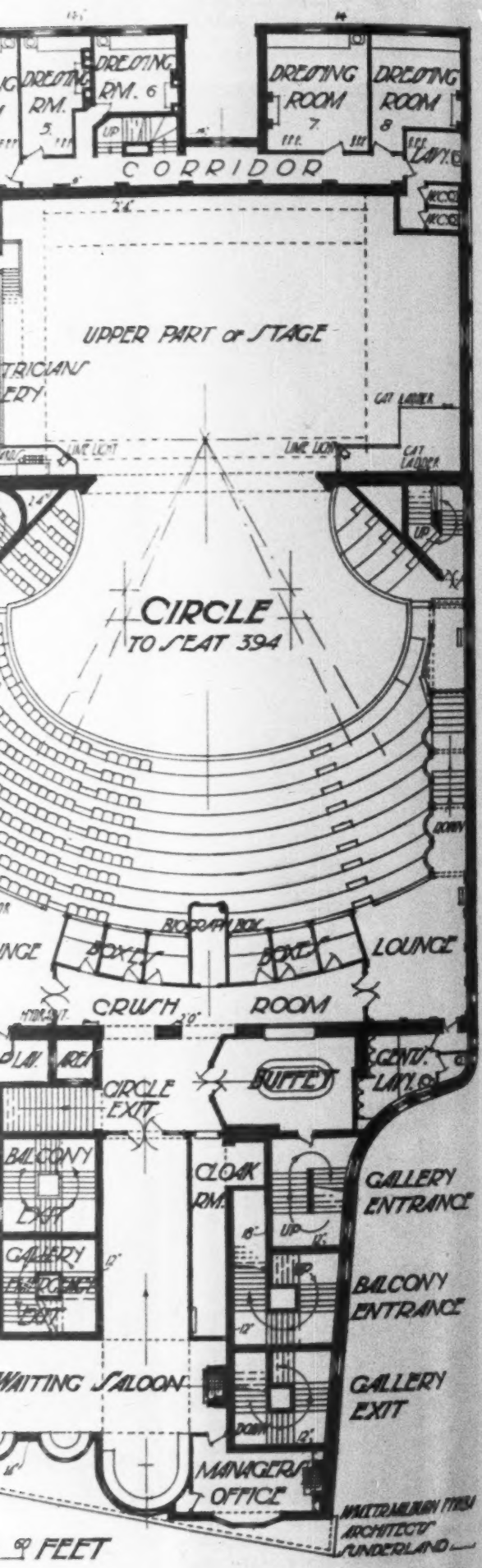

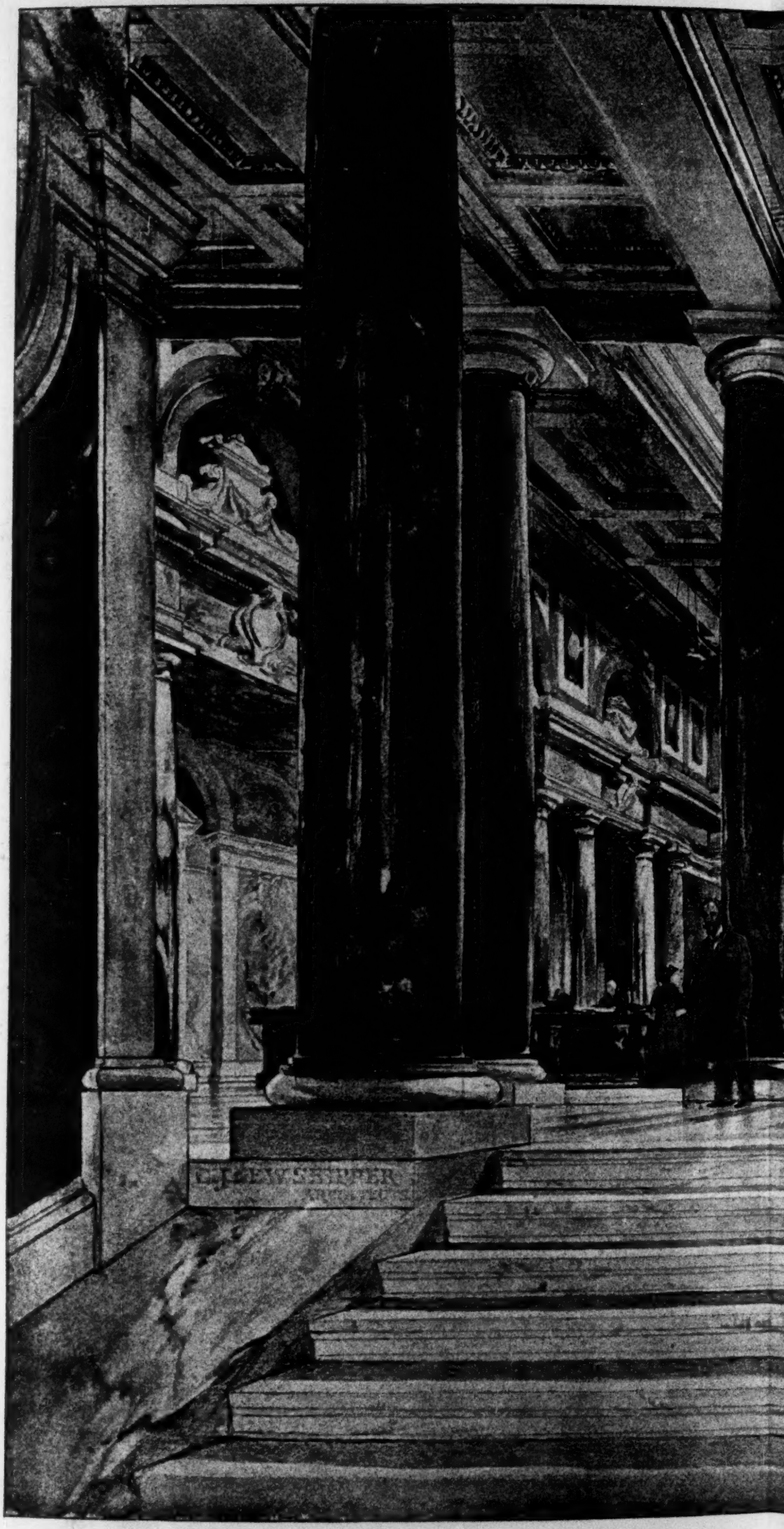

NORWICH UNION LIFE ASSURANCE SOCIETY'S

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URANCE SOCIETY'S HEAD OFFICE, NORWICH: INTERIOR.—Mr. George J. Skipper, F.R.I.B.A., Architect.

EXTERIOR VIEW.

. Parry, Photographer, South Shields.

NEW EMPIRE THEATRE, S

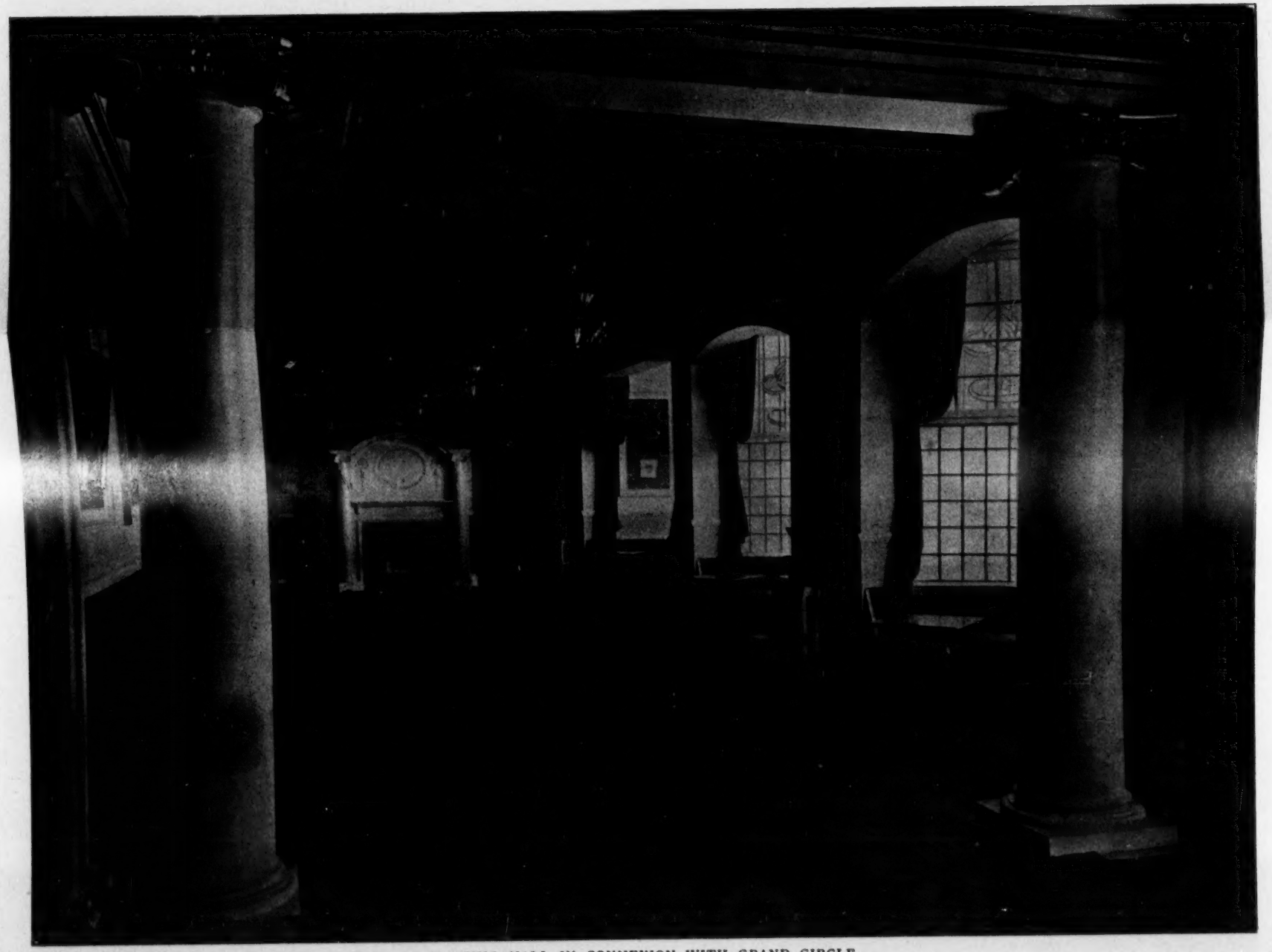
INTERIOR FROM PROSCENIUM OPENING.

MPIRE THEATRE, SUNDERLAND.—Messrs. W. & T. R. Milburn, FF.R.I.B.A., Architects.

Sprague & Co., Ltd., Printers, 4 & 5 East Harding

INTERIOR LOOKING TOWARDS STAGE.

INTERIOR LOOKING TOWARDS STAGE.



WAITING HALL IN CONNEXION WITH GRAND CIRCLE.

W. Parry, Photographer, South Shields.

Sprague & Co., Ltd., Printers, 4 & 5 East Harding St., E.C.

NEW EMPIRE THEATRE, SUNDERLAND.—Messrs. W. & T. R. Milburn, FF.R.I.B.A., Architects.

NEW HOUSE · SHANGHAI · CHINA · FOR A.K. CRADDOCK ESQ^R · MEDLEY. DENHAM & ROSE ARCHITECTS.

THE PHOTO-GRAPHIC & C° LTD 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

THE BUILDER, JUNE 13, 1908.

NEW HOUSE · SHANGHAI · CHINA · FOR A. K. CRADDOCK ESQ.ᴿ · MEDLEY, DENHAM & ROSE, ARCHITECTS.

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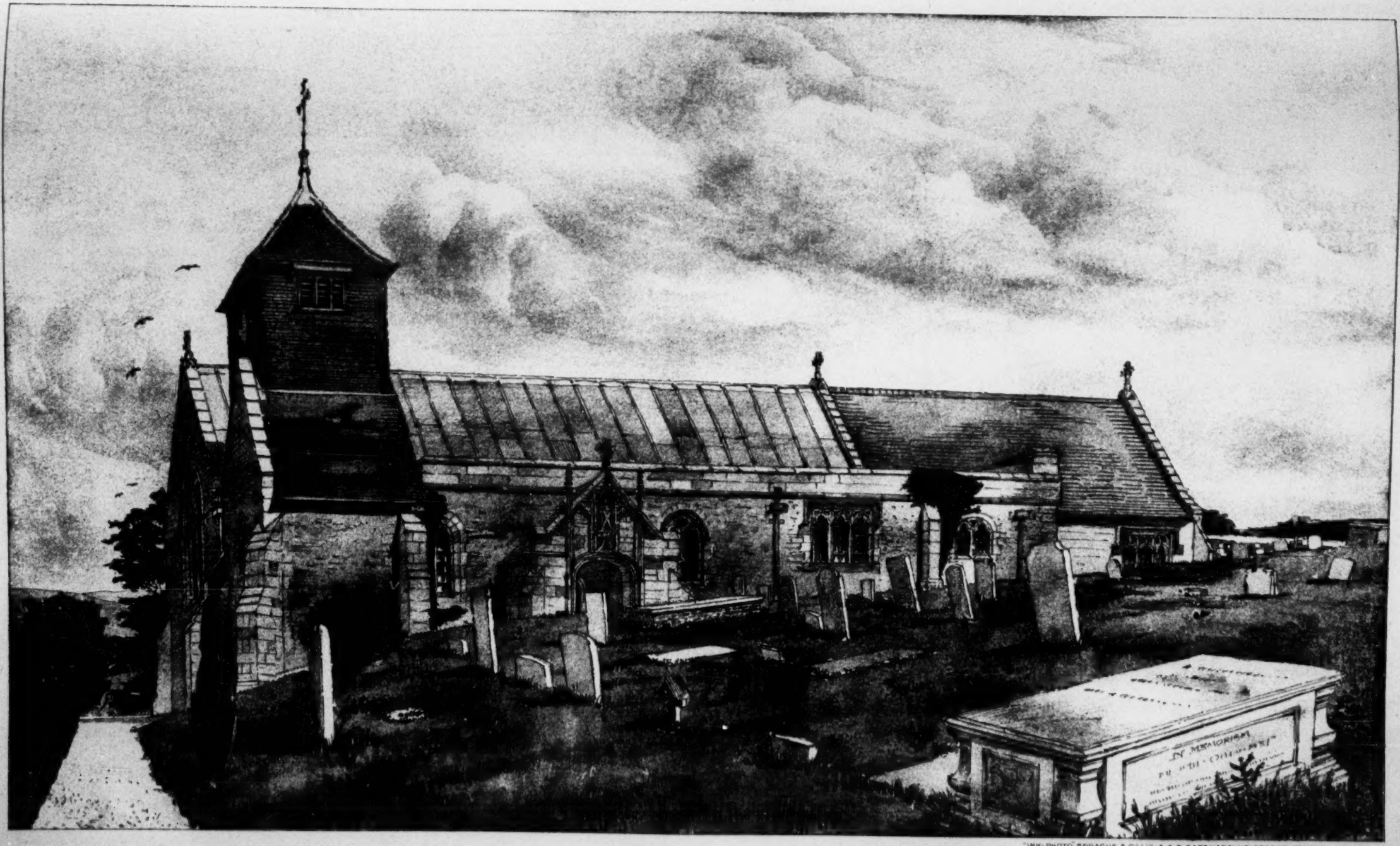

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ST. ANDREW'S CHURCH, ROCKBOURNE, HANTS: AS RESTORED.—Mr. C. E. Ponting, F.S.A., Architect.

Mr. John Taylor (Birmingham)—Fibrous plaster decorations and picture panels.
Mr. Geo. Tawse (Sunderland)—Painting and general decorator.
Messrs. Aitken & Austin (Sunderland) — General painting contract.
Messrs. John Coates & Sons (Sunderland)—Seating.
Messrs. H. Todd & Son (Sunderland) — Draperies, carpets, etc.
Messrs. Blackburn, Starling, & Co., Ltd. (Nottingham)—Electric plant, switch boards, dimmers, batten lights, revolving sign, etc.
The Sun Electric Co., Ltd. (London)—Large pendants in auditorium, etc.
Mr. Samuel Heath (Birmingham)—General electric fittings.
The Henley Telegraph Works (London)—Cable, etc.
The Conduit and Insulation Co., Ltd. (Newcastle-on-Tyne)—Tubing and general electric supply.
Messrs. J. G. Kirtley & Sons, Ltd. (Sunderland)—Fire hydrants, brass fittings, and general hardware.
Messrs. N. F. Ramsay Bros. (Newcastle-on-Tyne)—General hardware.
Messrs. Emley & Sons (Newcastle-on-Tyne)—Marble and alabaster and brass and iron handrails.
The Union Electric Co., Ltd. (Newcastle-on-Tyne)—Arc-lamps, etc.
Messrs. Keith, Blackman, & Co. (London)—Electric fans, etc.
The India Rubber, Gutta Percha and Telegraph Works Co. (Newcastle-on-Tyne)—Cable, etc.
Mr. Fred. J. Borland (Leeds)—Stage arcs, bioscope, etc.
The General Electric Co., Ltd. (Newcastle-on-Tyne)—General electric supplies.
Messrs. John Mallin & Co. (West Bromwich)—Fire-proof curtain.
Messrs. Edison & Swan (London)—Electric lamps, etc.
Messrs. McCulloch & Co. (Sheffield)—Stage equipment, scenery, etc.
Messrs. Burges & Co. (Liverpool)—Wood block floor.
Messrs. Hewitt & Son (London)—Copper dome and figure.
Messrs. Goodall, Lamb, & Heighway (Manchester)—Drop curtain and box draperies.
Mr. C. Haughton (Worcester)—Stone carving.
Messrs. Dawson & Walker (Newcastle-on-Tyne)—Leaded lights.
Mr. George Robson (Newcastle-on-Tyne)—Electric light contractor.

The consulting engineers for the electric light installation were Messrs. Snell & Moor Ede, Westminster, and the consulting engineer with respect to the steel construction being Mr. J. Lumsden Ray, of Bloomsbury-square, London.

The building was designed and carried out by Messrs. Wm. & T. R. Milburn, of Sunderland; the clerk of the works being Mr. Duncan Straughan (Sunderland); and Mr. T. P. Bell from the office of the architects.

HOUSE, NEAR SHANGHAI, CHINA.

THE house of which we give an illustration has been built at Route Say Qoong, near Shanghai.

A great demand has arisen of late at Shanghai for a type of domestic architecture which, although suited to the conditions of climate, is still reminiscent of "home." The tropical summer necessitates broad verandahs; the winter is such that the inhabitants are glad to toast their toes over the essentially English fire; and the exiled Colonial desires that, winter and summer, his retreat should speak to him of lands far distant.

The authors were thus faced with a three-cornered problem, the main points of which are not easily reconcilable. The illustration represents the compromise effected by the architects, Messrs. Denham & Rose, of Shanghai, China.

The walls are of brick rendered in rough-cast; the roof covered with tiles, and the woodwork is teak.

THE CHURCH OF ST. ANDREW, ROCKBOURNE, HANTS.

THIS church is one of very unusual and varied interest; it possesses good work of all the principal periods into which architecture is usually divided, from the XIIth to the XVIIIth centuries.

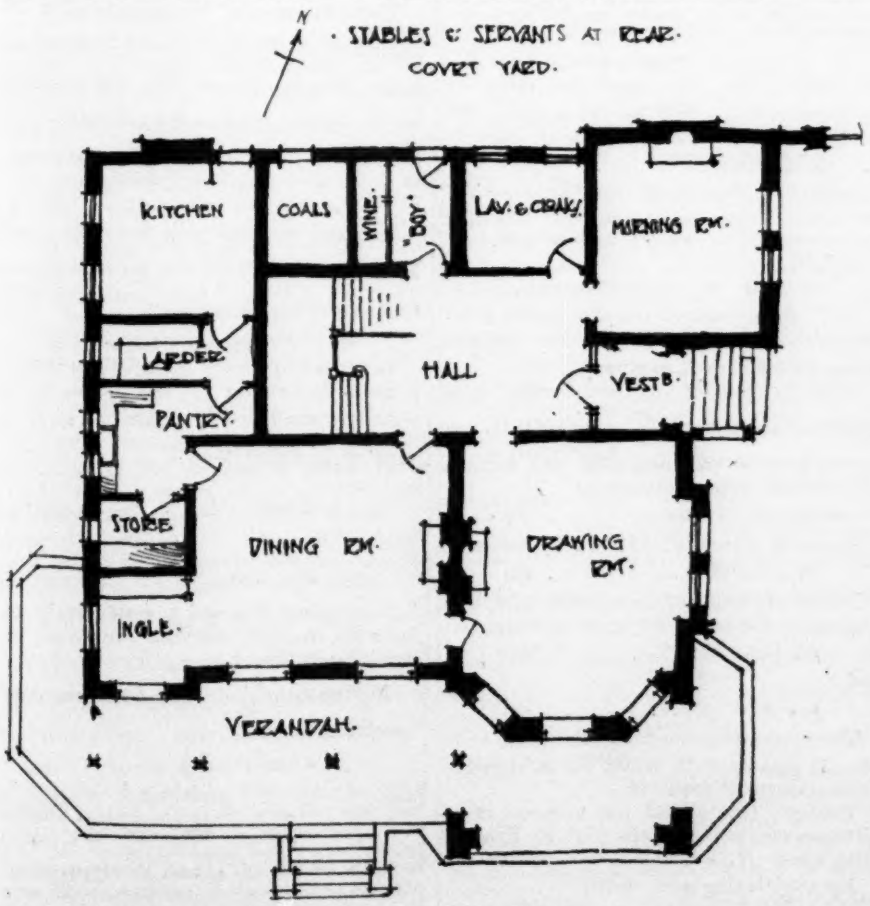
The plan of the church consists of a nave and south aisle of four bays, with south porch and north chapel, and a chancel with south chapel forming a continuation of the aisle.

The archway opening into the tiny north chapel is of early XIIth century date; the bulk of the walls of this chapel, also of the nave and aisle, may be set down at *cir.* 1280, with additions of windows and buttresses of Perpendicular type. The south chapel was added in the XVth century. The timber-framed bell-turret is dated 1630. Some of the oak pews, and the screens of the chancel and chapel, are interesting fittings of early in the XVIIIth century. The chancel was erected in 1827 without side windows—the latter were inserted, the buttresses added, and the south porch rebuilt (the latter taking the place of a dilapidated one of brick) in the course of the restoration of the church in 1892.

During the restoration several points of interest were revealed. As will be seen on reference to the sketch, the church is erected on the west slope of a steep hill, and the necessities of such a position, with the chancel running into the higher ground, account for some peculiarities in the arrangement. On opening out a blocked-up opening below the floor level at the west end it was found that an entrance existed here, with steps inside the nave leading up to the floor level.

The eastern bay of the nave was on a higher level than the remainder; this might have been to some extent due to the necessity for adapting the floors to the rising ground (and the slope of the floor itself, upward towards the east, confirms this), but it is obvious that a screen was carried across the nave at this point—a circumstance which seems to show that the church was used in connexion with the adjoining Priory (a branch of the Lazar House at Breamore). The jambs and arch of a richly-treated XIVth-century window existed in the west wall of the nave, and the destroyed tracery has been reproduced so far as their evidence could be taken as a guide.

The roofs of the old part of the church remain and have been placed in a sound state. The architect for the restoration was Mr. C. E. Ponting, of Marlborough.



House at Shanghai. Plan.

Competition.

PROPOSED NEW SCHOOL AT BRIDLINGTON.—At the monthly meeting of the Bridlington Education Committee, held on the 3rd inst., the Committee adjudicated on the plans sent in for the proposed new schools in Bridlington. There were in all ten received from nine competitors. By a large majority of eleven to two those of Mr. Joseph Earnshaw, Wellington-road, were accepted. The new school will be built to accommodate 500 scholars, and will be a mixed school with infants' department.

BOOKS RECEIVED.

GARDENS OLD AND NEW. Vol. III. Edited by H. Avery Tipping, M.A. (Geo. Newnes, Ltd. 21. 2s.)

THE ABBEYS OF GREAT BRITAIN. By H. Clairborne Dixon. (T. Werner Laurie. 6s.)

LIGHT AND AIR. By the late Professor Banister Fletcher. Fifth Edition, revised by Banister F. Fletcher and H. Phillips Fletcher. (B. T. Batsford. 6s. 6d.)

Correspondence.

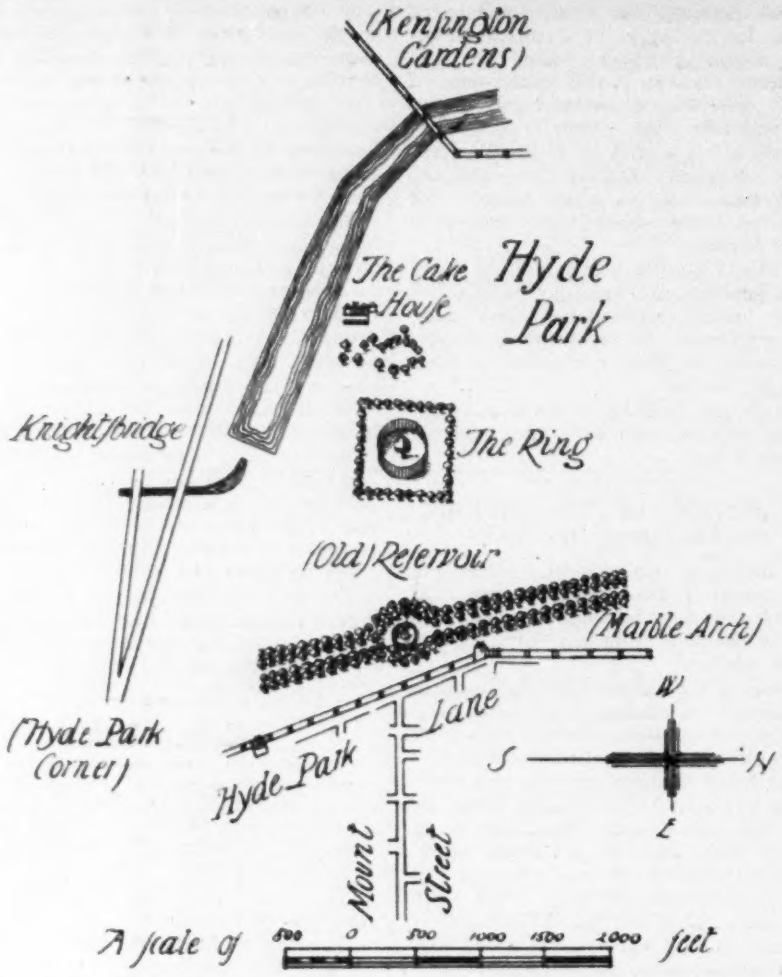
SUBCONTRACTING.

SIR,—Referring to your article on "Some Notes on Subcontracting" in last week's number of the *Builder*, I agree that a clear distinction should be made between the so-called "subcontractor" appointed by the architect and the more correctly termed "subcontractor" appointed by the building contractor.

I make it a practice as far as possible both in "quantities" and specifications to use the term "special contractor" for the specialist nominated by the architect, keeping the term "subcontractor" for any man to whom the contractor sublets part of the work.

In so doing I am aware that clauses 19 and 20 of the conditions of contract issued by the Royal Institute of British Architects do not bear me out, but there is a motive in the wording of these clauses, and it is this motive which causes most of the friction to which you refer in your article.

Clause 20 makes the specialist nominated by the architect a subcontractor, but as a matter of fact the specialist is independent of the building contractor, and if friction arises he has a way of flouting the building contractor. However, these specialists have come to stay and are largely on the increase, much to the serious inconvenience and trouble of the building contractor, who will have to be prepared to receive and entertain them on the works. The only point of this letter to you is to emphasise what you point out, namely, that a clear distinction should be made between the



"specialist" appointed by the architect and the "subcontractor," to whom the builder deputes some of the work.

F. COPE HUNT.

THE "OLD CHEESECAKE HOUSE," HYDE PARK.

SIR,—On July 6, 1901, you published a reproduction of a map of St. George, Hanover-square, parish "survey'd and delineated in . . . 1725 by John Mackay (sen. and jun.), mathematicians," and presented to the Vestry. The Mackays plot the old reservoir in Walnut Tree-walk; "The Ring," "The Cake House," at a (shortest) distance of 100 ft. north from the straight side of the canal; and the clump of trees midway between the cake-house and the Ring. The reservoir, ring, and group of trees lie in a line continued almost due west along Mount-street. The *data* corroborate the particulars given in your paragraph of May 30 (p. 644 *ante*), and indicate that the Cheesecake House stood at some little distance, south-west, from the new tea-house close to the present reservoir. The conversion of the canal and pools, fed by the Westburn brook, into the "Serpentine River," and the building of Ripley's "royal mansion," were, it is true, not begun before October 5, 1730—*London Journal, passim*—by Jefferson and Charles Withers; Kimberley completed the lake in or about 1733. Yet it seems that the existing margin of the lake is identical, or very nearly so, with the north shore of the canal as plotted in the survey of 1725.

D.-M.

TEMPERANCE INSTITUTE, COCKFIELD.—A new temperance institute is in course of erection at Cockfield. Of two stories, it will comprise a hall capable of seating 500 people, billiard, reading, and recreation rooms, a library, and baths. The estimated cost is 1,200*l*. Mr. B. Rand is the architect, and Mr. Edward Rutherford, of Cockfield, the sole contractor.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.—The *Gazette* of the 5th inst. contains the following:—"Privy Council Office, June 4, 1908. Notice is hereby given, that a petition has been presented to His Majesty in Council by the Royal Institute of British Architects, praying for the grant of a Supplemental Charter; and His Majesty having referred the said petition to a Committee of the Lords of the Council, notice is further given that all petitions for or against such grant should be sent to the Privy Council Office on or before July 6 next."

The Student's Column.

REINFORCED CONCRETE BEAM FORMULÆ.—XX.

ABRIDGED FORMULÆ FOR GIVEN QUALITIES OF CONCRETE AND STEEL.

NOTE.—The abridged formulæ in Sections (71) to (76) are for the permissible compressive stress in the concrete, $c_c = 500$ lb. per square inch, the permissible stresses in the reinforcement t_s and $c_s = 15{,}000$ lb. per square inch, and $m = 15$. Similar equations can readily be prepared for any given stresses and values of m.

(71.) *Rectangular Beams with Single Reinforcement.*—For the economic ratio of reinforcement $\rho = 0{\cdot}005$ by (5) and $x = 0{\cdot}3$ by (1), formulæ (7) and (8) can be abridged to

$$M_r = bh^2 74 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (79)$$

Example (41).—Find the moment of resistance of the beam specified in Example (5) where $M_r = 240{,}000$ inch-pounds.

By (79)

$M_r = 3240 \times 74 = 239{,}760$ inch pounds.

(72.)—*Rectangular Beams with Double Reinforcement.*—Proportion ρ_t and ρ_c so that the value of x shall be $0{\cdot}\dot{3}$, as given by (29).

Then by placing the compression reinforcement so that $u = \frac{x}{3}$, $c_s = 5{,}000$ lb. per square inch by (32) and (33), and formula (37) reduces approximately to

$$M_r = bh^2 [74 + 4400\, \rho_c] \quad . \quad . \quad . \quad . \quad (80)$$

Similarly, formulæ (38) and (39) reduce to

$$M_r = bh^2 \rho_t\, 13300 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (81)$$

In order to preserve the relations of ρ_t and ρ_c given by (34) and (35) we must make

$$\rho_t = (0{\cdot}005 + \tfrac{1}{3}\rho_c) \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (82)$$

and

$$\rho_c = (3\rho_t - 0{\cdot}016) \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (83)$$

These equations show that unless the value of ρ_t is greater than $0{\cdot}005$, no compression reinforcement is required.

Example (42).—Find the moment of resistance of the beam specified in Example (25) where $M_r = 320{,}000$ inch-pounds.

By (80) taking $\rho_c = 0{\cdot}005$

$M_r = 3240\, [74 + 4400 \times 0{\cdot}005] = 318{,}900$ inch-pounds.

By (82) for $\rho_c = 0{\cdot}005$ we get

$$\rho_t = (0{\cdot}005 + \tfrac{1}{3} 0{\cdot}005) = 0{\cdot}0074$$

Then by (81)

$M_r = 3240 \times 0{\cdot}0074 \times 13300 = 318{,}880$ inch-pounds.

(73.)—*T-Beams with Single Reinforcement: Class I.—Neutral axis coincident with or above the under surface of the flange.*—For the economic ratio of reinforcement with $\frac{b_1}{b} = 1$, $\rho = 0{\cdot}005$ by (43), and $x = 0{\cdot}3$ by (40), formulæ (45) and (46) reduce approximately to

$$M_r = b_1 h^2 74 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (84)$$

Example (43).—Find the moment of resistance of the beam specified in Example (30) where $M_r = 960{,}000$ inch-pounds.

By (84)

$M_r = 12960 \times 74 = 959{,}040$ inch-pounds.

NOTE.—The ratio of reinforcement to be actually employed is $\rho \frac{b_1}{b}$, or in this case, $\left(0{\cdot}005\ \frac{40}{10}\right) = 0{\cdot}02$.

(74.)—*T-Beams with Single Reinforcement: Class II.—Neutral axis below the under surface of the flange.*—Let the flange depth be two-thirds the depth of the neutral axis, or $v = \frac{2}{3}x$.

Then for the economic ratio of reinforcement with $\frac{b_1}{b} = 1$, $\rho = 0{\cdot}004938$ by (51), and $x = 0{\cdot}3$ by (48), formulæ (53) and (54) reduce approximately to

$$M_r = b_1 h^2 67 \quad . \quad . \quad . \quad . \quad . \quad . \quad (85)$$

Example (44).—Find the moment of resistance of a beam having the dimensions specified in Example (32) but with the flange $4\frac{1}{2}$ in. deep, or $v = \frac{3}{5}x$.

By (85)

$M_r = 12960 \times 67 = 868{,}320$ inch-pounds.

NOTES.—The result $M_r = 750{,}000$ inch-pounds in Example (32) was for the flange depth of 3 in., or $v = \frac{5}{8}x$. For that relative depth formula (85) would be approximately $M_r = bh^2 58$, giving $M_r = (12960 \times 58) = 751{,}680$ inch-pounds.

Similar modifications of formula (85) can be made to suit any relative flange depth.

The ratio of reinforcement to be actually employed is $\rho \frac{b_1}{b}$, or in this case $\left(0{\cdot}004938\ \frac{40}{10}\right) = 0{\cdot}019752$.

(75.)—*T-Beams with Double Reinforcement: Class I.—Neutral axis coincident with or above the under surface of the flange.*—Proportion the ratios of reinforcement ρ_t and ρ_c so that the value of x shall be $0{\cdot}\dot{3}$ as given by (56).

Then by placing the compression reinforcement so that $u = \frac{x}{3}$, $c_s = 5{,}000$ lb. per square inch by (59) and (60), and by employing the value ρ_c calculated for the ratio $\frac{b_1}{b} = 1$, formula (64) can be reduced approximately to

$$M_r = b_1 h^2\, [74 + 4400 \rho_c] \quad . \quad . \quad . \quad (86)$$

Similarly by employing the value ρ_t calculated for the ratio $\frac{b_1}{b} = 1$, formulæ (65) and (66) reduce approximately to

$$M_r = b_1 h^2 \rho_t 13300 \quad . \quad . \quad . \quad . \quad . \quad . \quad (87)$$

In order to preserve the relations of ρ_t and ρ_c given by formulæ (61) and (62) so that the value of x shall be $0{\cdot}\dot{3}$, we must make, for any ratio of $\frac{b_1}{b}$ higher than 1,

$$\rho_t = \left(0{\cdot}005 \frac{b_1}{b} + \tfrac{1}{3}\rho_c\right) \quad . \quad . \quad . \quad . \quad (88)$$

and

$$\rho_c = \left(3\rho_t - 0{\cdot}016 \frac{b_1}{b}\right) \quad . \quad . \quad . \quad . \quad (89)$$

The values of ρ_t and ρ_c respectively to be inserted in these formulæ are those to be actually employed.

For the ratio $\frac{b_1}{b} = 1$, the equations must be modified thus:—

$$\rho_t = \left(0{\cdot}005 + \tfrac{1}{3}\rho_c \frac{b}{b_1}\right) \quad . \quad . \quad . \quad . \quad (88a)$$

and

$$\rho_c = \left(3\rho_t \frac{b}{b_1} - 0{\cdot}016\right) \quad . \quad . \quad . \quad . \quad (89a)$$

The values of ρ_t and ρ_c respectively inserted in the formulæ are those to be actually employed, and the results given by (88a)

and (89a) are merely for the purposes of calculation with formulæ (86) and (87).

Example (45).—Find by (88) and (88a) values of ρ_t for $\rho_c = 0{\cdot}023$, (1) for $\frac{b_1}{b} = 4$, (2) for $\frac{b_1}{b} = 1$.

(1.) By (88)

$$\rho_t = {\cdot}005 \times 4 + \tfrac{4}{3}({\cdot}023) = 0{\cdot}03.$$

(2.) By (88a)

$$\rho_t = {\cdot}005 + \tfrac{1}{3}({\cdot}023 \times \tfrac{4}{1}) = 0{\cdot}0075$$

Example (46).—Find by (89) and (89a) values of ρ_c for $\rho_t = 0{\cdot}03$, (1) for $\frac{b_1}{b} = 4$, (2) for $\frac{b_1}{b} = 1$.

(1.) By (89)

$$\rho_c = 3 \times {\cdot}03 - {\cdot}016 \times 4 = 0{\cdot}023.$$

(2.) By (89a)

$$\rho_c = 3 \times {\cdot}013 \times \tfrac{1}{4} - {\cdot}016 = 0{\cdot}0058$$

Example (47).—Find the moment of resistance for the beam specified in Example (35) where $M_r = 1{,}296{,}000$ inch-pounds.

By (86) taking $\rho_t = 0{\cdot}0058$ for $\frac{b_1}{b} = 1$ (see Example (46)

$$M_r = 12960\,[74 + 4400 \times {\cdot}0058] = 1{,}236{,}000 \text{ inch-pounds.}$$

By (87) taking $\rho_t = 0{\cdot}013$ for $\frac{b_1}{b} = 1$ (see Example (45)

$$M_r = 12960 \times {\cdot}0075 \times 13300 = 1{,}294{,}260 \text{ inch-pounds.}$$

(76.)—*T-Beams with Double Reinforcement: Class II.—Neutral axis below the under surface of the flange.*—Proportion ρ_t and ρ_c so that the value of x shall be $0{\cdot}3$ as given by (68) and let the flange depth be two-thirds the depth of the neutral axis, or $v = \frac{2}{3}x$.

Then by placing the compression reinforcement so that $u = \dfrac{3xv - 2v^2}{6x - 3v}$, $c_s = 5411$ by (71) and (72), and by employing the value ρ_c for the ratio $\frac{b_1}{b} = 1$, formula (76) reduces approximately to

$$M_r = b_1 h^2\,[67 + 5000\rho_c] \quad . \quad . \quad . \quad . \quad (90)$$

Similarly by employing the value ρ_t calculated for the ratio $\frac{b_1}{b} = 1$, formulæ (77) and (78) reduce approximately to

$$M_r = b_1 h^2 \rho_t\, 13600 \quad . \quad . \quad . \quad . \quad . \quad . \quad (91)$$

In order to preserve the relations of ρ_t and ρ_c given by formulæ (73) and (74) and the value $x = 0{\cdot}3$ as given by (68), we must make, for any ratio of $\frac{b_1}{b}$ higher than 1

$$\rho_t = \left({\cdot}004938\,\frac{b_1}{b} + {\cdot}36\rho_c\right) \quad . \quad . \quad . \quad (92)$$

and

$$\rho_c = \left(2{\cdot}7\rho_t - {\cdot}0137\,\frac{b_1}{b}\right) \quad . \quad . \quad . \quad (93)$$

For the ratio $\frac{b_1}{b} = 1$

$$\rho_t = \left({\cdot}004938 + {\cdot}36\rho_c\,\frac{b}{b_1}\right) \quad . \quad . \quad . \quad (92a)$$

and

$$\rho_c = \left(2{\cdot}7\rho_t\,\frac{b}{b_1} - {\cdot}0137\right) \quad . \quad . \quad . \quad (93a)$$

Examples (45) and (46) serve the purpose of illustrating the manner in which these formulæ are to be employed, as they are essentially similar to formulæ (88) to (89a).

Example (48).—Find the moment of resistance for the beam specified in Example (39) where $M_r = 1{,}322{,}000$ inch-pounds.

By (90) calculating $\rho_c = 0{\cdot}007$ for $\frac{b_1}{b} = 1$

$$M_r = 12960\,[67 + 5000 \times {\cdot}007] = 1{,}321{,}920 \text{ inch-pounds.}$$

By (91) calculating $\rho_t = 0{\cdot}0075$ for $\frac{b_1}{b} = 1$

$$M_r = 12960 \times {\cdot}0075 \times 13600 = 1{,}321{,}920 \text{ inch-pounds.}$$

MINISTER'S RESIDENCE, SOUTHMOLTON.—The Wesleyan Methodists at Southmolton are providing a new house for their minister. The cost of the residence—which adjoins the chapel premises—will be about 700*l*. The architect is Mr. W. C. Oliver, of Barnstaple, and the builders are Messrs. Southwood & Sons, of Landkey.

NEW PUBLIC OFFICES, WESTMINSTER.

THIS block of offices, as far as the building has been carried out, is now in rapid preparation for occupation. The area of the site covered is about 3 acres, and the portion yet to be built will occupy 2 acres more. A bridge with three arches has been erected connecting the building with the Home Office block. The exterior is of Portland stone supplied by the Bath Stone Firms, the sculpture in the pediment is the work of Mr. Bertram MacKennal, that on the bridge is by Mr. Paul Montford, while the spandrils are by Mr. Frith, who has also, with Messrs. Daymond & Sons, executed the carving. The interior is, with the exception of a few rooms on the principal floor, of a plain character. The principal staircase and entrance halls are constructed of mazzano marble. The building is to be occupied by the Local Government Board and the Education Department, the former having the part facing Parliament and Great George streets and the latter the remainder. The foundations were carried out by Messrs. Mowlem & Co., and the superstructure by Messrs. Spencer, Santo, & Co., both of Westminster. The lighting is by electricity. The electric supply is taken from the Westminster and the London Electric Supply Companies; the wiring has been carried out by the Government's own staff—the distribution wires being obtained from the Liverpool Electric Cable Company, and the main conductors from Messrs. Siemens. The electric fittings generally have been supplied by Messrs. Verity, those of a special character being provided by the Bromsgrove Guild. The heating installation is on the Webster Atmospheric System, and has been carried out by Messrs. Strode & Co., the radiators being supplied by the British Radiator Company. In the boiler-room four Lancashire boilers, 28 ft. by 7 ft. 6 in., have been fixed, and a smaller boiler of Cornish type, 18 ft. by 5 ft., for use in summer; these boilers were supplied by Messrs. Adamson, and the setting carried out by Messrs. H. Windsor & Co. For protection against fire a No. 3 Ellington hydraulic injector has been installed by the Hydraulic Engineering Company. The four passenger and two hydraulic goods lifts and a number of small electric service or paper lifts, were constructed by Messrs. R. Waygood & Co., Ltd., with the exception of the ash or coal platform lift, which was supplied by the Easton Lift Company. The whole of the engineering work has been executed under the direction of the Chief Engineer to the Commissioners of Works, Mr. E. G. Rivers, I.S.O., M.Inst.C.E.

The following is a list of the firms employed in various branches of the work:—

Works.	Contractors.
The foundations	Messrs. J. Mowlem & Co., Ltd.
The superstructure	Messrs. Spencer, Santo, & Co., Ltd.
Marble work	Messrs. W. Garstin & Sons, Wigmore-street, W. Messrs. Farmer & Brindley, Ltd., Westminster Bridge-road, S.E. Messrs Daymond & Sons, Edward-street, Vauxhall
Plasterers' work	Messrs. A. & S. Wheater, Leeds.
Plaster ornament	Messrs. H. H. Martyn & Co., Ltd., Cheltenham.
Internal tiling	Messrs. Carter & Co., Poole.
Tiling and parapets	Messrs. G. Woolliscroft & Son, Ltd., Great Portland-street, W. The Stourbridge Glazed Brick and Tile Company.
Sanitary plumbing work	Mr. W. E. Bone, Adam-street, Adelphi, W.C.
Mosaic and terrazzo flooring	The Mosaic Marble and Tile Company, Holloway, N. Messrs. Diespeker, Ltd., Holborn-viaduct, E.C.
Wood block flooring	Messrs. R. L. Low, Ltd., Farnworth. Mr. J. F. Ebner, Cubitt Town.
Wood-carving	Messrs. H. H. Martyn & Co., Ltd. Messrs. Farmer & Brindley, Ltd.
Stained glass	Messrs. Oscar Paterson & Co., Glasgow. Mr. Wallace Howard, Oxford-street, W.
Stair balustrading	Messrs. Jones & Willis, Ltd., Hornsey.
Wrought-iron and bronze gates	Messrs. W. Bainbridge Reynolds, Ltd., Clapham.
Wrought-iron work	Messrs. T. Brawn & Co., Birmingham.
Electric bells	Messrs. Comyn Ching & Co., Ltd., Castle-street, Long-acre, W.C.
Stoves and special grates	Messrs. Cooker & Co., Rotherham Messrs. W. Bainbridge Reynolds, Ltd. Messrs. T. Elsley & Co. Great Portland-street, W.
Chimney-pieces	Messrs. G. R. McKenzie & Co., Battersea.
Steam cooking apparatus	Messrs. Wenham & Waters, Croydon.
Gas-cooking plant	The Carron Foundry Company, Upper Thames-street, E.C.
Domestic hot-water services	Messrs. R. Crittall & Co., Noel-street, War our-street, W.
Steam pumps and mains	The Brightside Foundry and Engineering Co., Ltd., Sheffield.

THE LONDON ASSOCIATION OF MASTER DECORATORS.

A MEETING to ratify formally the formation of their Association and to adopt rules and appoint officers and committee was held in the Council-chamber of the Holborn Restaurant on the evening of June 1.

A general meeting of the Master Decorators, held on the 12th ult., appointed a committee to draft rules for the proposed Association, and it was to receive their report that the meeting of the 1st inst. was called.

Mr. Jno. Anderson, of Kensington, the chairman of the provisional committee, was elected to the chair. Between forty and fifty members were then elected.

Mr. Anderson said that the committee had carefully discharged the duties relegated to them at the last meeting, and had prepared a set of rules which he thought would meet their requirements. They had given much consideration to the name, and had come to the conclusion that the title "Master Decorators" was comprehensive, and included the allied trades which were associated with the name in the London area. They did not wish to clash with any existing organisations or societies, but he and those associated with him felt that their interests were often sacrificed for want of a body such as they were now organising to protect them. Suggestions had been made that they should amalgamate with another society, but he thought that the time was not ripe for that. It was part of their programme to affiliate with the National Association of Master Painters of England and Wales, who would bring their influence to bear on all trade questions.

The rules as submitted were taken seriatim, and adopted as printed.

The meeting next proceeded to elect the President.

Mr. Jno. Anderson nominated Mr. H. A. Campbell, of Messrs. Campbell, Smith, & Co., as the first President of the Association. Mr. Chas. Patten seconded, and the resolution was carried.

Mr. Campbell then took the chair, and, in acknowledging the honour done him, said that he would not have accepted the position of President if he had not thought he could be of some service to the Association. He wanted to see a strong Association formed, so that they might effectually deal with those matters referred to by Mr. Anderson. In addition to the question of discounts, there were other matters which needed the most earnest consideration of the Association. He would like to see some restriction put upon the custom of supplying designs, whereby firms were often put to great trouble and expense without any consideration of the cost. They must try and induce every good firm in the metropolitan area to come into their Association. He had received a letter from the President of the Incorporated Institute of British Decorators, who had suggested that they should amalgamate their forces. He had promised to lay the matter before them.

The President read the letter, and after some considerable discussion it was decided that at present they must adhere to the original programme, and the question of amalgamation must be left over.

Mr. Jno. Anderson was appointed Vice-President, and Mr. J. J. Honeychurch was elected Treasurer.

Mr. Frank Stuart Murray, who attended on the invitation of the President, also spoke. He said he found himself cordially in sympathy with the objects of the proposed Association. He spoke as an architect and member of the Incorporated Institute of British Decorators. The decorators' craft was of a high technical order, requiring skill and long training, and was specially exposed to injury from the irregular and severe competition initiated by the departments of large general trading companies. The time was ripe for some attempt to be made to control the abuse of the system of free designs and estimates, which had grown to such an extent as to seriously impair the legitimate profits of business. Mr. Murray quoted a case in which the total value of the designs and costs of preparing estimates submitted by different firms in a competition must have amounted to at least one-fourth of the value of the contract. The abuse of the discount system by private and professional persons also called for remedy. In conclusion he said that the formation of the society was a marked progress in the right direction (the direction of effective control), and of a recognised code of honourable trading; but that, in his opinion, the ultimate goal should be the

incorporation of all the associations with the ancient and historical Company of Painters of the City of London.

A vote of thanks to Mr. Anderson for his services as chairman of the provisional committee and to the President concluded the business.

At a subsequent meeting of the committee, Mr. Fred Dakin, of Putney, was elected chairman of the committee, and Mr. Alexander Davidson, of 21, Finsbury-pavement, was appointed Secretary to this Association.

Obituary.

MR. BELL, M.INST.C.E.—The Hon. Valentine Græme Bell, C.M.G., died on May 29, aged 69 years. In March last he retired from the post of Director of Public Works in Jamaica, to which he had been appointed in 1887. Mr. Bell was apprenticed to Messrs. Wren & Hopkinson, of Manchester, engineers, and having then become a pupil of James Brunlees, was resident engineer during three years on the Cleveland Railway, and in 1866-8 on the Mont Cenis line. Twelve years afterwards he went to Jamaica to report to the Colonial Office upon the railway from Kingston to Spanish Town, which he extended to Ewarton and Port Antonio. In 1886 he was made a member of the Legislative Council. His son, the Hon. A. G. Bell, is Director of Public Works in Trinidad.

SIR ROBERT GILLESPIE REID.—The death, on June 3, at Montreal, is announced of Sir Robert Reid, railway contractor. Sir Robert, a native of Coupar-Angus, N.B., went to America in 1871, and became contractor for the Lachine bridge across the river St. Lawrence at Montreal, the bridge across the Niagara, and portions of the Canadian Pacific line. He was the first president of the Reid Newfoundland Company, and a director of the Bank of Montreal, the Royal Trust Company, and the Canadian Pacific Railway. Sir Robert Reid undertook with the Government of Newfoundland to assume the control and direct the development of all the lines in the island during a term of fifty years.

MR. L. G. MOUCHEL.—We regret to have to announce the death of Mr. L. G. Mouchel, at Cherbourg, on May 27 last. He was born in that town in 1852, and received his education as an engineer at the Government School of Mines in France. He was subsequently engaged in engineering practice in France until he came to England, and settled in South Wales as a mining engineer. In the year 1898 he acquired from Mons. François Hennebique the sole agency in the United Kingdom for his system of ferro-concrete construction. In 1902 he was elected a member of the Soc. Ing. Civ. de France. Since 1898 Mr. Mouchel devoted himself entirely to this branch of engineering, and has covered the country with many fine examples of ferro-concrete buildings and engineering works to the number of some 600. About a year ago he took Messrs. J. S. E. de Vesian, M.Inst.C.E., and T. J. Gueritte, M.Soc.C.E. France, into partnership, arranging that the chief members of his permanent staff should also participate in the business, which has from that time been carried on under the name of L G. Bouchel & Partners, Ltd., thus transferring a large proportion of his increasing responsibility on to their shoulders. In addition to Mr. Mouchel's qualities as an engineer, his personality endeared him to a large circle of friends, and his generosity and sympathy with all in need will make his loss felt by many charitable institutions both here and abroad.

THE PROPOSED BRIDGE, ACTON.—Sir Alexander Binnie, who had an account against the Council for 105*l.* for the preparation of the design and estimate for a proposed bridge over the North and South-Western Junction Railway (which scheme has been abandoned), has settled his claim by accepting 80*l.*

THE ACTON DISTRICT COUNCIL *v.* HUNT.—The appeal by the Acton District Council against the verdict for 800*l.* in favour of Mr. G. W. Hunt, architect, has been dropped, on the plaintiff agreeing to accept 400*l.* and taxed costs. A few weeks back Mr. Hunt offered to settle the case on the payment of 250*l.* His solicitors have explained to the Council that he had to claim 800*l.* (2½ per cent. on the estimated cost of the building) because that was the sum they advised he was technically legally entitled to under the conditions relating to his employment, but he has from the commencement been ready and willing to waive his strict rights and to settle on any reasonable terms. Because he has obtained judgment for the full 800*l.*, Mr. Hunt has no wish whatever to enforce it, and therefore, to bring about an amicable settlement, he has accepted the offer of the Council to pay 400*l.* and taxed costs.

General Building News.

TOWER RESTORATION, PRINCES RISBOROUGH.—The restoration of the tower and spire of the parish church, which has entailed an expenditure of at least 2,000*l.*, has been completed. The contract was carried out by Mr. Franklin, of Deddington, from plans prepared by Mr. J. Oldrid Scott, of Westminster.

PRIMITIVE METHODIST CHURCH, HEXHAM.—On the 8th inst. the foundation and memorial stones of a new Primitive Methodist church and school were laid at Hexham. Owing to the peculiar conformation and gradients of the site, the church will be over the school hall in one building. The hall will accommodate about 400, and has several classrooms arranged contiguous to it. The church will accommodate about 500. The method of warming throughout will be by low-pressure hot water, and the ventilation by means of wall inlets and extract ventilator in flèche on roof. The lighting will be by gas. The architects are Messrs. Cackett & Burns Dick, of Newcastle-on-Tyne, and the contractor for the work Mr. John Civil, of Hexham. The outlay will be between 5,500*l.* and 6,000*l.*

BAPTIST CHAPEL, HALIFAX.—A new church has been erected by the Baptists at Lee Mount, Halifax. Accommodation is provided for 326 in the area and 435 in the galleries, a total of 761. In the rear of the chapel are young men's and young women's classrooms, a lecture-hall, and infants' rooms. Mr. Abraham Sharpe, of Bradford, is the architect. The contracts for the buildings amounted in the aggregate to 3,650*l.*, but with a few extras for alterations, etc., they are expected to reach 4,000*l.*

PUBLIC SCHOOL, ABERDEEN. — The new Ruthrieston public school, Aberdeen, is now practically finished. The total amount of the loan sanctioned by the Department for the erection of the school was 17,500*l.*, and this includes not only the cost of the buildng but its equipment and furnishings, etc. The building was designed by Mr. J. A. O. Allan, the Architect to the Board, and its erection was carried out under his supervision by the following contractors:—Mason work, Mr. Edgar Gauld; carpenter work, Messrs. Hendry & Keith; slater work, Messrs. Merson & Stewart; plaster work, Messrs. Sellar & Co.; plumber work, Mr. J. J. Johnston; painter and glazier work, Messrs. J. Mason & Son; blacksmith work, Mr. George Thomson; heating engineer work, Mr. Robert Tindall; steam boiler, Messrs. James Abernethy & Co.; electric lighting, Claud Hamilton, Ltd.; desks, Messrs. James Garvie & Sons; and furniture, Messrs. James Allan & Co.

ELEMENTARY SCHOOL, HIGH WYCOMBE.—The foundation-stone was recently laid of a new elementary school at Spring-gardens. The front elevation will be constructed of red bricks, relieved by Portland stone dressings, and the roof will be slate. The school is to accommodate 600 children—300 boys and 300 girls. The ventilation will be carried out by Messrs. Kite & Co., of London. It has not yet been decided whether the schools will be lighted by gas or electricity. The flooring of the assembly-hall will be of wood blocks. It is intended to asphalt the playgrounds. Mr. J. T. Harris (Wycombe) is the contractor, his tender amounting to 6,898*l.* The plans were prepared by Mr. Thomas Thurlow, architect.

BUILDING IN EDINBURGH DURING 1907.—Mr. James Massie, Burgh Engineer and Master of Works, in his annual report to the Town Council of Edinburgh on the work carried out by the department under his charge during 1907, states with reference to the Dean of Guild Court work that, although the number of warrants granted by the Dean of Guild Court is the largest since 1899, the value of the work covered by these warrants is the lowest since 1901. This is accounted for by the large number of minor warrants applied for, which does not represent work of much value. Were it not that warrants were granted throughout the year for several large public buildings, which swell the amount under this head by 132,300*l.* above the figures of last year, the total would show up very poorly indeed. Villas have fallen in number and value by one-half, and self-contained houses (including flatted villas) have decreased in number from 330 in 1906 to 191 in 1907, and in value from 240,000*l.* to 98,510*l.* for these years. The value of tenement property for which warrants were granted, 172,905*l.*, although not much below the figures of last year, is still on the down grade, but the value of alterations sanctioned—viz., 79,962*l.*—shows an increase over 1906 of 6,102*l.* The value of property certified as completed and fit for occupation is 506,990*l.*, which is 20,475*l.* below the corresponding figure of last year. In number and value, villas, self-contained houses, and tenement property show an increase over last year's returns; but under the heading "Public and other buildings" there is a falling-off in value of 103,225*l.* Nine plans were submitted to the Council during the year for new feuing proposals, and for amendment on plans already sanctioned. The area of new proposals sanctioned amounted to 10½ acres, and one proposal embracing an area of 18½ acres was not approved. The length of new streets sanctioned under these proposals amounted to 946 yds., and the new drains to 1,256 yds. New sewers of a total length of 3,530 yds., and over which supervision had been extended, had been laid in new streets.

SCHOOL IMPROVEMENTS, INVERKEILOR, N.B.—Improvements are to be made to the Inverkeilor Public School, and the School Board have accepted the estimates of the following:—Mason work, Mr. Thomas Reid, Montrose; joiner, Mr. R. C. Farquhar, Arbroath; slaters, Messrs. Mitchell & Sons, Arbroath; plasterer, Mr. A. C. Donald, Arbroath; plumbers, Messrs. Cook & Sons, Arbroath; wood-block flooring, Messrs. Geary, Walker, & Co., Ltd., London. Mr. John Sim, C.E., Montrose, is the architect.

NEW BUSINESS PREMISES IN OXFORD-STREET.—New premises have been opened by Messrs. Mappin & Webb in Oxford-street. The architect of the new building was Mr. John Belcher, A.R.A.

CHURCH HALL, TALWORTH, SURREY.—A new church hall is being built in St. Matthew's parish. The building is being erected by Mr. Frank Hawkey, according to designs prepared by Mr. W. H. Coombs, at a cost of about 1,200*l.*

PROPOSED NEW MUNICIPAL OFFICES, DEVONPORT.—A Special Sub-committee of Devonport Borough Council Finance Committee recently considered an instruction from the Council to report upon the estimated cost of a scheme for erecting new municipal offices on a site not at present built upon. Several sites were suggested by members of the Committee, and the opinion was expressed that the cost of the scheme would be 60,000*l.* The Committee arrived at the conclusion that the portion of the western side of Devonport Park, below the Royal Albert Hospital and abutting on Newpassage-hill, would be the most suitable site for the proposed new municipal buildings, and a Committee, of which the Borough Surveyor, Mr. J. F. Burns, is a member, was appointed to take steps to ascertain whether the Government will give permission for the land to be used for the purpose suggested.

PROPOSED ALTERATIONS TO THE WORKHOUSE, BISHOP AUCKLAND.—It is proposed to carry out a scheme of improvement at the Bishop Auckland Workhouse. Mr. Livesay is the architect for the scheme, and the total estimated outlay is 16,925*l.*

NEW THEATRE, OXFORD.—The present theatre in Oxford, opened twenty-two years ago with a performance given by the Oxford University Dramatic Society, will shortly be pulled down. The new theatre will be built after plans and designs prepared by Mr. W. G. R. Sprague.

GOLF PAVILION, PRESTWICK, N.B.—The members of the Prestwick St. Cuthbert Golf Club are having a new pavilion built. The designs were obtained in a competition in which eighteen architects were invited to submit plans, those of Mr. J. Gibb Morton, Glasgow, being accepted. The building is of brick, rough-casted in cream tints, on a base of pressed bricks, with tops of chimney stalks built in stone and pressed brick, and roofs covered with red tiles. The principal parts of the interior will be wood panelled.

Sanitary and Engineering News.

NEW WATERWORKS, BOLTON.—Work has just been begun on the new reservoir at Delph, an undertaking which will involve this town in the expenditure of a quarter of a million sterling. The holding capacity of the reservoir, when completed, will be 500 million gallons, and the work is being carried out under plans prepared by Mr. R. H. Swindlehurst, M.Inst.C.E., Borough Waterworks Engineer, and his assistant, Mr. L. Mitchell. The Waterworks Committee have accepted the tenders of the following firms for the work:—Messrs. John Best & Son, Ltd., Edinburgh, 218,406*l.* 17*s.* 4*d.*; Messrs. Jackson & Brother, Bolton, 3,448*l.* 13*s.*; and the Staveley Coal and Iron Company, Ltd., Chesterfield, 2,623*l.* 18*s.*; total, 224,479*l.* 8*s.* 4*d.*

WATER APPLIANCES FOR SANITARY FITTINGS.—The Public Health Committee of Battersea Borough Council reported this week having received a communication from the chief sanitary inspector to the effect that in a recent case of the neglect of a builder to give notice of the fixing of a flushing cistern, as required by the by-laws of the London County Council,

the builder stated that notice was not required to be given in other London boroughs, and he was not aware that notice was required to be given in Battersea. The Committee had been in communication with the Metropolitan Water Board upon the subject, and had suggested that the Board should insert a note in their notices requiring the fixing of new water appliances in connexion with sanitary fittings to the effect that notice must be given to the sanitary authority before any such work is commenced. The Board, however, had written stating that they did not see their way to print this information. The Public Health Committee of Battersea is of opinion that the matter should be brought now to the notice of the London County Council with a view to their calling the attention of the Metropolitan Borough Councils to the fact that in some boroughs the by-law does not appear to be enforced. A communication is to be addressed to the Spring-gardens authority accordingly.

Foreign.

THE REBUILDING OF SAN FRANCISCO.—According to the report of Mr. Consul-General Walter R. Hearn on the trade of the consular district of San Francisco during 1907, the building operations started in that year exceeded all previous records. That, he remarks, was to be expected at that stage of the rebuilding of that large city. The tight money market had retarded building operations much more than it had interfered with the sale of real estate, and many believed that the scarcity of money had been a blessing in disguise, for, with money as easy and as cheap as it was during the first quarter of the year, San Francisco might have been overbuilt. The fire consumed 28,188 buildings, valued at 105,000,000 dols. (21,000,000*l*.). There had been erected in round numbers 6,000 buildings, and 3,000 more were in course of construction. The estimated value of these 9,000 buildings was 104,000,000 dols. (20,800,000*l*.), or just 1,000,000 dols. (200,000*l*.) less than the value of three times as many buildings destroyed. Those figures gave some idea of the character of the buildings which were being erected to replace those lost. But there was an even more significant feature in regard to those buildings, and that was that the floor space of the new structures was estimated to be greater than the floor space of all the buildings destroyed. Many of the stores and offices were still located in the residential part of the city, being bound by leases or being unable to find the accommodation they required in the business part of the town. Referring to the comparative costs of construction in San Francisco and other towns the Consul-General remarks that the matter has excited much interest owing to the peculiar state of affairs prevailing in the city since the fire of April, 1906. The California Promotion Committee had made investigations into the building conditions, securing data from builders, contractors, labour organisations, etc., not only in San Francisco, but also in Chicago and New York, and the results showed that the cost of building now ruling in the former city was but slightly in advance of that in either of the other two cities mentioned. As compared with conditions before the fire, the present cost of building in San Francisco showed an increase of from 10 to 12 per cent., and in that connexion it must be remembered that there were several factors which were now rapidly being changed. The condition of the streets added greatly to the cost owing to the fact that more time was consumed in hauling material, and that horses and vehicles wore out much more rapidly that when the streets were good. As soon as the streets were repaired the additional cost would be reduced. With the exception of pressed brick and steel the general average cost of building materials was said to be lower in San Francisco than in New York or Chicago. The figures as to cost of labour showed a general increase of about 25 per cent. over similar labour in Chicago and New York, and also over similar labour in San Francisco before the fire. As it was estimated that the cost of labour was about 45 per cent. of the total cost of a building, it would be seen that that 25 per cent. increase made the general increase on the building, with no increase in the cost of material, from 10 to 12½ per cent., which, to some extent, was offset by the earlier use of the structure due to the increased efficiency of the workmen owing to climatic conditions, which also allowed work to be carried on almost without interruption.

GRECIAN MARBLE.—Mr. Cottrell, British Consul at Syra, in the Cyclades, writes that among the numerous holdings of Marmor, Ltd., a British company with headquarters in London, owning and working several groups of marble quarries throughout Greece, are the valuable quarries of Tinos Island, which contain very large deposits of dark green marble with white and violet veining—a most beautiful variety. They are situated close to the sea in the Bay of Choussoula, where the blocks of marble are loaded by means of jib-cranes into sailing vessels and transported to the Piræus for transhipment abroad. The extraction of solid blocks of all sizes is possible by means of helicoidal wire saws attached to the rock. Lengths of 20 ft. to 30 ft. are not unusual, while frequently blocks up to 60 ft. are obtained. The installations are modern and extensive, including helicoidal-wire sawing plants, driving engines, powerful cranes, railways, piers, houses for the officials and workmen, stores, etc. The Tinos green marble is extensively used in Europe for furniture tops, as well as for internal decorative work, while in the United Kingdom and America it is much sought for columns, pilasters, etc., principally for its beauty and solidity. The production in 1907 exceeded 1,000,000 tons, of which 592,587 tons were exported to various countries, including 69,276 tons to London. The quarries of marble in Paros Island have been practically at a standstill for some years, but, Marmor, Ltd., having bought them up, it is supposed they will be worked again later on. The Parian marble has been celebrated from the time of the ancients, and its beauty is eminent owing to its pure whiteness and fine-grained nature. It is well known that the statue of the Venus de Milo at the Louvre in Paris was carved from Parian marble. Quarries of marble also exist in Navor Island, which is particularly adapted and employed in Greece for decorative building, but only on a small scale of late, owing to want of capital.

GRANITE INDUSTRY OF NORWAY.—From the report of the British Consul for Norway, it appears that the most important stone quarries are found in the Idefjord, where excellent granite occurs in inexhaustible abundance. From here the stone is exported principally to the United States, Germany, America, and Mexico. Near Christiania quarries of red quartz syenite are being worked, and near Drammen and Tonsberg quarries of red biotite granite. At Larvik angite syenite is found, round the coast gneiss granite is quarried, and at Saltenfjord excellent marble is found. The export of granite during 1907 was 140,000 tons, of the value of 111,000*l*., and came chiefly to the United Kingdom. Very little granite was exported during the year.

Miscellaneous.

STATUE OF THE LATE QUEEN VICTORIA, LANCASTER.—A statue of the late Queen Victoria has been erected at the Royal Grammar School, Lancaster. It has been designed and executed by Mr. Caleb J. Allen, sculptor, Lancaster, and fills the niche over the central doorway of the school.

REVOLVING DOORS.—We have recently seen a self-opening door, the invention of Mr. R. Falkland Carey, of Messrs. Pemberton, Arber, & Co. On either side of the doors is a floating platform, covered by a mat, which, when depressed by the weight of the person passing through, communicates its motion by a series of levers to the doors themselves, which thus open automatically, and are closed again by a counter-weight. As the doors are hung centrally and work in an arc, meeting edge on, a rebate is possible, which renders them practically draught-proof. The mechanism is very simple, somewhat resembling the action of a weighbridge, and entirely free from springs. Slamming is obviated by an ingeniously-contrived double-acting oil dash-pot. A pit of about 8 in. in depth and 6 ft. 6 in. in length is necessary to contain the mechanism. The Van Kannel Revolving Door Company also draw our attention, in reference to the danger from crowds pushing against the doors, to their safety and emergency revolving door, which on any abnormal pressure gives way on both sides, the opposite leaves lying parallel in the centre of the passage-way. This does away with the danger of crowds pushing against each other on opposite leaves of the door. But we are by no means convinced that a form of door which in any case places an obstacle in the centre of the doorway is such an unmixed advantage as it is claimed to be. We noted, in going over the plans of the new Government offices the other day, that though revolving doors were suggested by the original architect, the Office of Works had declined to adopt them.

THE CITY OF LONDON DIRECTORY.—The new edition of this excellent and useful work has just been issued by Messrs. W. H. & L. Collingridge, 148 and 149, Aldersgate-street, E.C. It is as well arranged and printed as previous issues, and it contains a mass of information relating to the City. In the alphabetical, street and trade sections is given a list of the firms carrying on business in the City. The section concerned with the local life of London gives a full list of members of the Corporation, arranged alphabetically, and also according to the wards they represent; a list of the committees; and a list of the members of the London County Council and of the committees. The City Companies' section summarises the history of each Guild; gives a list of the 9,000 Liverymen; and explains the work undertaken in the interests of trade and technical education. Other features of the "Directory" include a list of the members of the new Government; portraits and short biographical sketches of the Aldermen, the members of Parliament for the City, and the Masters of City Companies; lists of members of the Lieutenancy and Lloyd's; and an excellent map in colours of the City of London. The published price of the Directory is 12s. 6d.

THE INTERNATIONAL DRAWING CONGRESS.—On the way to the International Drawing Congress, between 300 and 400 American art teachers are to make long tours of the European schools, and the first two parties of these travellers have already left Boston. They are at Naples and Grenada respectively. Their tour will last 100 days, and is to cost them 140*l*. each. Shorter tours from Boston and New York will commence on June 20 and 27 and July 4 and 18, but all are so arranged as to bring the tourists to London on August 1 or 2 for the opening ceremonies of the Congress. Naturally these arrangements allow of a good deal of sightseeing as well as study. One of the longer tours includes Grenada, Seville, Toledo, Madrid, Gibraltar, Naples, Pompeii, Rome, Florence, Venice, Milan, Switzerland, the Rhine, Cologne, and Holland. To the Congress and its exhibition, which they will strongly reinforce, the travellers are devoting eleven days.

WIDENING OF WALWORTH-ROAD.—At the last sitting of the Southwark Borough Council, it was reported that a communication had been received from the London County Council with reference to an opportunity which had occurred for acquiring property for the widening of Walworth-road, between Liverpool-street and Trafalgar-street, the cost of which would be about 7,000*l*. It was decided that the London County Council be informed that the Borough Council would be prepared to contribute one-third of the cost of the improvement between Liverpool-street and Trafalgar-street, such cost, however, not to exceed 2,500*l*., and to include the cost of paving to be executed by the Borough Council, and that the London County Council be requested to contribute one-half of the cost of the purchase of the property for the improvement of Walworth-road at the corner of Sutherland-place.

NEW RIVER COMPANY AND THE "KING'S CLOGG."—In delivering judgment on June 5 in the suit of Adair *v.* the New River Company, Ltd., and the Metropolitan Water Board, Mr. Justice Warrington decided that the Water Board are under an obligation to continue the payment of the Crown or King's Clogg to Sir Frederick E. S. Adair, Bart. By a writ of Privy Seal, May 12, 1698, William III. assigned the Clogg to one Dennis Cooling; it then became vested in William Adair, through whom Sir Frederick Adair derived his title as tenant for life of the rent-charge. The Clogg, now reduced to 400*l*. per annum by deduction of land tax, has its origin in a covenant made in 1631 between King Charles I. and Sir Hugh Myddleton and his heirs and assigns, whereby the latter agreed to take over the "King's Moiety" of the New River undertaking and to pay the King, his heirs and successors a yearly rent of 500*l*. The "King's Moiety" arose from the terms of the letters patent issued on June 21, 1619, under which Sir Hugh Myddleton and the twenty-eight other "adventurers" were incorporated as a company, and the net profits were divided equally between the King and the adventurers. James I. had already agreed to provide the adventurers with half the money they needed for the accomplishment of their enterprise upon a condition that he should take half the profits. His lordship held that under the Metropolis Water Act, 1902, and the New River Company's Act, 1904, the obligation to pay the sum yearly became transferred to the Board, and was secured upon the water fund established by the former statute.

EDINBURGH COLLEGE OF ART DIRECTORSHIP.—A meeting of the Board of Management of the new Edinburgh College of Art was held on the 5th inst., with a view to appointing a Director of the College. Mr. John R. Findlay presided. The short leet submitted by the General Purposes Committee consisted of Mr. Stewart H. Capper, M.A., A.R.I.B.A., Professor of Architecture, Manchester University; Mr. William Bower Dalton, Principal, London

County Council Camberwell School of Arts and Crafts; and Mr. Frank Morley Fletcher, H.M. Inspector of Schools of Art. The name of Professor Capper was withdrawn, and the Board resolved to delay making an appointment, in order that members who had not yet met Mr. Dalton and Mr. Fletcher should have an opportunity of doing so.

KURSAAL, HASTINGS.—The Corporation have adopted, by twenty-one votes to three, the recommendation of their Committee to sell for 12,000*l.* a large portion of the Brisco estate for the erection of a Kursaal, upon condition that the promoters of the scheme shall expend 50,000*l.* upon the building and the laying out of the grounds. They have further stipulated that if the syndicate buy the hospital or other property on the sea front they shall pay the Corporation 5,000*l.* for new roads between the sea front and the Brisco estate.

BESSEMER HOUSE, DENMARK-HILL.—This property, covering 13 acres, and held from Dulwich College for a term of nearly thirteen years unexpired, at a ground rent of 200*l.* per annum, is placed in the market. The house was built for the late Sir Henry Bessemer, and still presents many evidences of his scientifical experiments and pursuits, together with the observatory and its fittings.

TENEMENT HOUSES INSPECTION.—In his annual report, which has just been issued, the Medical Officer of Health for Marylebone (Dr. Meredith Young) says that there are, approximately, 750 tenement houses in the borough, which demand most constant and systematic surveillance. Wherever one has a collection of individuals using common property and conveniences the responsibility for good sanitary conduct is necessarily subdivided. This subdivision of responsibility will act like dry-rot on the hygenic morals of the community concerned unless pretty drastic measures are employed. It is alike to the interest of the property owner and the tenant that very frequent inspection should be carried out. The London County Council (General Powers) Act, 1907, sect. 78, contains a long-needed provision as to water supply of tenement houses. The wording is somewhat involved, but it is taken to mean that there must be a proper and sufficient supply of water on every floor of a tenement house on which there are rooms separately occupied.

Capital and Labour.

GLASGOW JOINERS' WAGES.—Mr. A. A. Hudson, barrister-at-law, the arbitrator appointed by the Board of Trade to adjudicate upon certain proposed alterations on the working by-laws between the Glasgow Master Wrights' Association and the operatives, has now issued his decision. The employers' proposals were that the operatives should take breakfast before starting from November 16 to January 31, and that the wages should be reduced. The operatives, on the other hand, wished an eight-hours' day for five days of the week, and five hours on Saturday, or a forty-five-hour week—a reduction on the present working hours per week of six hours. They further proposed a limitation of the number of apprentices in proportion to the number of journeymen employed. The conciliator has not given effect to the operatives' proposal for shortening the working hours, and has fixed that they take breakfast before starting from December 9 to January 8. He has also reduced the wages from 9½d. to 9¼d., and limited the number of apprentices.

Law Reports.

MASTER PLASTERER'S ACTION AGAINST TRADE UNION AND ITS OFFICIALS.

THE following is an extended report of the judgment of the Lord Chief Justice, delivered on the 4th inst., in the case of Smithies *v.* the National Association of Operative Plasterers and others, and which was briefly summarised in last week's issue of the *Builder*.

His lordship said the action was brought by the plaintiff, Mr. William Smithies, trading as C. Smithies & Sons, in respect of alleged losses sustained by him by reason of the action of the defendant Association, the other defendants being Michael Deller, the secretary, since dead, Stephen Wall, John Pomsford, and John Dear, trustees of the property of the Association, H. Duckett, secretary of the Birmingham branch of the Association, and J. Forrester and W. H. Ecclesby, men who had engaged to work for the plaintiff under agreements for terms of years, which were still running. Plaintiff's claim arose out of the conduct of the defendant Association in calling out from the plaintiff's works, on January 17, 1905, the members of their union, nine or ten in number, of whom two, Ecclesby and Forrester, were working for the plaintiff as plasterers, Forrester under an agreement dated December 23, 1901, for a term of five years from that date, and Ecclesby under an agreement of March 5, 1904, for a term of three years from that date. Plaintiff was a master plasterer in a large way of business, and undertook large contracts and sub-contracts for plastering under building contracts. Plaintiff alleged that Forrester and Ecclesby were engaged by him, not only as plasterers, but as scagliola workers, and in the case of Forrester at extra wages at the rate of 1*s.* per hour. The other men, whose names were Whetter, W. Gardner, R. Gardner, Lancaster, Baker, Row, and Rawlings, were all engaged on terms which enabled them to quit on giving one hour's notice terminating at the end of any working day. The circumstances which led to the men being called out were as follows:—Prior to May, 1902, a builder named Bower was engaged in carrying out a large contract at Hollymoor Asylum. On that contract one, Jas. Gibbs, who was then a member of the defendant Association, was foreman, and had working under him, as such foreman, a number of men who were members of the defendant union. Some question was raised whether these men were receiving the rate of wages which, according to the rules of the defendant union, or some branches of it, they ought to receive. On July 1, 1902, the whole of the members working at Hollymoor Asylum were summoned, and in some cases fines under the rules of the Association were inflicted. At a meeting of the committee of the local branch of the Association on December 19, 1902, Gibbs and Baker attended, and it was resolved and recommended that the annual general meeting should take stern measures. On January 5, 1903, at a committee meeting of the Birmingham branch, Gibbs and Baker were fined 20*s.* should they continue to work at the asylum with non-unionists after January 10. In March, 1903, Gibbs paid the fine, and received sick pay from the union for some weeks. He still, however, continued to work at Hollymoor with persons alleged to have been non-unionists, and on May 20 was fined 2*l.* for persisting to work contrary to clause 24 of rule 8, and it was further resolved that if the fine was not paid by January 27, Gibbs should be expelled according to the rule. He (his lordship) found as a fact that in July, 1903, Gibbs was expelled from the union, and from that date ceased to be a member. No evidence was given before him to show that any workmen working at Hollymoor were receiving a less rate of wages than they were entitled to claim. In the course of the year 1904 plaintiff took a contract for plastering Barnsley Hall, which was fourteen miles from Birmingham, and plaintiff engaged Gibbs as his foreman. He (his lordship) accepted plaintiff's statement that prior to his interview with Duckett in October, 1904, he had no knowledge of the trouble between Gibbs and the defendant Association. Gibbs commenced work in September, and Duckett then raised some question as to the wages which the plaintiff was paying on the job; but that question appeared to have been settled. At the same interview, however, plaintiff said that Duckett asked him whether he knew that Gibbs was objectionable to the union, and a non-union man, and what the plaintiff intended doing about him. The plaintiff replied that the matter rested between the Association and Gibbs, and was no concern of his. Similar conversations occurred between the plaintiff and Duckett on two further occasions, one a fortnight and the other three week later. Between November 29, 1904, and January 17, when the men were called out, correspondence passed, and on Tuesday, January 17, nine or ten men, members of the union, including Forrester and Ecclesby, were called out. If the question between the parties had to be decided solely with reference to the previous decisions regarding the action of trade unions, or if this had been a claim by Gibbs against the Association for improper action by which he suffered damage, the case would not have presented much difficulty, but the circumstances to which he was about to refer rendered it necessary to consider the plaintiff's claim quite apart from the principles which had been dealt with in the majority of previous cases. Prior to the month of April, 1904, there had been long discussions between the masters and operatives in the building and plasterers' trades. These questions had relation to the rates of wages, overtime, expenses of and time occupied in going to and from work, the interference of the men in the membership of the Operative Society, and other questions, and, as the result of lengthened discussions, upon April 12, 1904, an agreement was made, the existence of which, in his opinion, was extremely important, and had a direct bearing upon the rights of the plaintiff and the obligation of the defendants in this action. The material clauses of the agreement were as follows:—Clause 1 said: "The National Association of Operative Plasterers will not take any steps to compel men regularly employed as foremen or superintendents of plasterers to become members of the National Association of Operative Plasterers, and the employers will not take any steps to compel any men to cease their membership, or prevent them joining the Operatives' Society." Clause 3 said: "No boycotting or black-listing shall take place by the National Association of Operative Plasterers in future where the firms adhere to the rules mutually agreed upon, and should any firm be engaged to do any portion of plastering work and do not pay the recognised rate of wages, it shall not be considered a violation of this agreement should the National Association of Operative Plasterers enter a protest. The employers agree that such rules shall be strictly enforced in all parts of their contracts." Clause 5 said: "In the event of any dispute arising on any job or works the district officials of the National Association of Operative Plasterers shall send written notice to the local Association of Master Builders and Master Plasterers, who shall inform them whether the said employer is a member of either of these bodies. If so a strike shall not be sanctioned by the National Association of Operative Plasterers until six clear working days have expired from receipt of such notice, during which time the matter shall be considered by a joint committee of employers of plasterers and members of the Operatives' Union (such committee to be elected annually), with a view to an amicable settlement; failing a local settlement, reference shall immediately be made to a standing joint committee consisting of members of the employers' and operatives' central bodies, and until they have met and discussed the grievance no strike or lock-out shall be sanctioned either by the National Association of Operative Plasterers or by the Employers' Association. With regard to the alleged refusal of members of the National Association of Operative Plasterers to work with workmen who may not belong to a trade union, it is understood the men the operative plasterers object to work with are defaulters and other men who have been shown to the employers to have made themselves specially objectionable to the union men." Clause 6 said: "No employer shall be called upon to pay more than the local standard rate of wages to men engaged in a town or district where the work is being executed, and where no established rate exists that of the nearest town or district shall be adopted." The effect of this agreement was that certain concessions were made by clause 6 in favour of the employers as regarded the rate of wages which should be paid. By clause 1 the Operative Plasterers undertook not to take any steps to compel men to become members, and the employers not to take steps to compel men to abstain from being so, but at the end of clause 5 it was clearly stated that the Operative Plasterers objected to work with defaulters and men known by the employers to be specially objectionable to the union men. This agreement was signed by the plaintiff on behalf of the Master Plasterers, and also by the Master Builders, and among others by Deller, the secretary of the defendant Association. It was alleged by the defendants' witnesses, that rightly or wrongly, they *bonâ fide* regarded Gibbs and several other men who were working at Smithies's, and who had been fined by their Association, as defaulters, and that they were desirous of having the question as to whether they had any just cause of complaint against the plaintiff settled under clause 5 of the above agreement. The defendants' witnesses stated that they were quite prepared to acquiesce in any decision given under that clause, and that they alleged that the men were called out because, in their view, the masters refused to arbitrate or to act under clause 5 of the agreement. It was contended by Mr. Lush that the action of the Birmingham branch during the months of November and December, 1904, was not *bonâ fide* in order to obtain a decision under clause 5 of the agreement, but that they were using the occasion for unfairly interfering with Gibbs and the other men working at Smithies's, and in support of this contention Mr. Lush relied upon clause 1 of the agreement, and said that the defendants were endeavouring to force Gibbs to become a member of the National Association of Operative Plasterers. He was not satisfied of this. It was true that there was evidence that Duckett asked Gibbs to return and again become a member but there was no evidence of compulsion, and Gibbs said he had offered to join and pay up his back subscriptions, but they would not allow him to do it. Having gone most carefully through all

the correspondence and the minutes, and listened attentively to the evidence of the defendants' witnesses, his lordship saw no ground for coming to the conclusion that they were acting otherwise than *bond fide*, and he found as a fact that, whatever might be the consequences of their act, the defendant Association and its Birmingham branch did sanction the men being called out, believing that they were acting within their rights, after having given six days' notice under clause 5.

His lordship, having referred to the correspondence, documentary and oral evidence given during the trial, said that upon the facts the important question arose, apart from ratification, had the plaintiff established any cause of action against the defendant Association? It was contended by Mr. Lush that they did by their conduct influence men bound to the plaintiff by contract, and that nothing in the facts justified such action. It was contended by Mr. Simon, first, that the defendant Association, in sanctioning the strike, were ignorant that any of the men were bound by contract to the plaintiff; and, secondly, that the existence of the agreement of April, 1904, the express reservation therein of the right of the men to object to work with defaulters, and the neglect of the masters to allow the dispute which had arisen to be settled pursuant to the terms thereof, justified the defendant Association in sanctioning the strike. After careful consideration he had come to the conclusion that the contention of the defendants was correct. By the April agreement the masters, in his opinion, recognised that under some circumstances the workmen and the trade union on their behalf might have the right to object to defaulters or men who were objectionable being allowed to work with the unionists. He thought that that agreement was made for good consideration, the masters obtaining important concessions in regard to wages, and to workmen abstaining from strikes, boycotting, and other hostile action. He found as a fact that members of the Association and the Birmingham branch *bond fide* believed that the masters were endeavouring to avoid having the dispute settled under clause 5 of the agreement, and that they called the men out, not with a view of getting any contracts broken, but because they could not get the dispute settled in the manner contemplated by the agreement; and he believed the evidence given by the defendants that, had the decision of the conciliation board respecting Gibbs and the other defaulters been against them, they would have acted upon it without further objection. Having carefully considered the minutes of the central Association, he found as a fact that they authorised and sanctioned the men being called out on January 17, no doubt in ignorance of the existence of the agreements between the plaintiff and Forrester and Ecclesby, and therefore if the act of the Birmingham Association gave rise to a cause of action, in his judgment the defendant Association was responsible. In his opinion the most difficult part of the case was that which depended upon the question of ratification. He found as a fact that the defendant Association did ratify the action of the Birmingham branch after they knew that Forrester and Ecclesby had been under agreements, and combined to pay strike pay. The question as to how far the ratification made the defendant Association liable for what had been done was, in his opinion, one of great difficulty. That they allowed Forrester and Ecclesby to remain out with knowledge that they were breaking their agreements was, he thought, established. But as he held that the action of the Association and the Birmingham branch up to January 17 was *bond fide* with a view to bringing about a settlement under clause 5, and that the men were called out under the power recognised by the agreement in the event of the men failing to obtain a settlement of their grievance as to working with defaulters, the ratification was not sufficient to enable the plaintiff to recover against the Association upon the ground that they wrongfully induced Forrester and Ecclesby to break their agreements. He could not accept the view that the plaintiff's scagliola business was wholly destroyed by the absence of Forrester and Ecclesby. He was of opinion that as the Trades Union Disputes Act of 1906 was not retrospective, the action could be maintained against the Association and its officers. On the other hand, he was of opinion that the defendants Forrester and Ecclesby were individually liable in damages for their breach of contract, but the action against them should have been brought in the County Court. He assessed the damages against those defendants at 25*l.* each, and gave judgment for the plaintiff against those defendants for those amounts, with costs on the County Court scale. Against the other defendants the action would be dismissed with costs.

His lordship granted the plaintiff a stay of execution with the view to an appeal to the Court of Appeal.

CLAIM BY A SURVEYOR FOR FEES.

On the 4th inst., at the West London Police Court, there was a summons before Mr. Lane, K.C., taken out by Mr. A. H. Wharton Glasson, District Surveyor for Hammersmith, against the Franco-British Exhibition, Incorporated, in respect of a claim for 141*l.* 1s. 3d. as fees for surveying a building at the exhibition called the Agricultural Hall. Mr. Horace Avory, K.C., and Mr. Patrick Hastings appeared in support of the claim, and the defendant Corporation was represented by Mr. Broxholm. Mr. Horace Avory observed that the claim was made under sect. 154 of the London Building Act, wherein it was laid down that the surveyor's fees were payable in the first instance by the builders, and, in default of payment by them, by the owners. In this case the builders of the Agricultural Hall, Messrs. Findlay & Co., wrote to the surveyor definitely refusing to pay the fees, so Mr. Glasson was obliged to sue the Exhibition Corporation.

After a long argument as to the responsibility for the payment, the magistrate decided in favour of the plaintiff, and made an order on the defendant Corporation for the payment of the sum claimed, together with 25*l.* costs.—*The Standard.*

Patents of the Week.

APPLICATIONS PUBLISHED.*

10,837 of 1907.—M. PETERS: *Sash-windows.*

This relates to a sash-window in which by a hand lever the upper and lower sashes can be liberated, characterised in that after the fastener of the upper sash is opened the upper non-slidable sash can be moved from the frame by means of a hand lever whereby the lower sash which is balanced by a counterweight can be moved upwards as desired and supported by hand, turned inwards. Bearings are screwed on the window frame, the former having two metal arms in them. One of the arms is furnished with a handle forming together a small hand lever. These two links are connected by a metal rod which fits in a groove along the bottom end of the upper sash. They are thus connected with the upper sash, and have shoulderlike projections at their bottom ends, each of the two shoulders striking on a support attached to the sides of the bracket containing the bearings.

10,899 of 1907.—J. B. S. BUNCH, C. R. BUNCH, and F. R. BUNCH: *Door Knobs or Handles and Spindles for Securing Doors at Will Against Being Opened from One Side.*

This relates to a pair of door knobs or handles and their spindle, of which the spindle and the inner knob or handle are mounted in a manner which allows of endway movement in combination with means whereby an endway movement of such spindle and knob or handle brings parts into such relation to one another as will ensure that the turning of the other knob or handle will not cause the spindle to turn.

12,120 of 1907.—R. H. PARKER and W. H. BAKER: *Domestic Fire-grates.*

This relates to arranging a trivet in the back of the fire-grate. The trivet normally lies vertically behind the back, and when required for use is pulled up and falls forward over the fire and is retained in a horizontal position. The back fireclay lining is formed with a cavity or recess behind for the trivet when out of use. When the trivet is required to be used it is drawn up and falls forward over the fire and is horizontally sustained resting upon the top of the back fireclay lining, and is held by side lugs meeting stops near the top of lug race; after use the trivet is pushed up, when it falls into its recess.

13,222 of 1907.—G. HALL: *Pivots for Reversible Casements and Window-sashes.*

This relates to a window with its opposite stiles or top rail divided, and the parts pivoted on a bolt passing into both parts through plates let into both parts of the divided stiles, the plates being provided with semicircular slopes rising at a low angle from nothing to the maximum, the said bolt having a spring coiled on it and secured in such a manner that, while the window is frictionally fixed at any desired position when open, the automatic action of the semicircular slopes separates the divided stiles—free to turn—in the act of opening the window, the reverse action taking place in closing.

* All these applications are in the stage in which opposition to the grant of patents upon them can be made.

17,196 of 1907.—W. MARSHALL and E. H. WARDEN: *Fastenings for Use in Connexion with Pivotally-hung Casement Windows, Fanlights, French Windows, Doors, and the like.*

This relates to a fastening for casement windows, fanlights, doors, and the like, comprising a pivoted catch carried by the inner side of the casement or the like adapted when said casement or the like is in its closed position to engage over the inner side of the sill or other fixed frame, or when said casement is opened to engage with one or other of a series of openings or piercings in a stay-plate or the like carried by said fixed frame. The catch comprises a pivoted arm connected to a handle or other operating means, and provided with a nose or extension adapted to be moved over the slotted stay-plate and to be engaged with one or other of the slots when the casement is opened, or when the latter is closed to engage over the inner side of the sill. The catch is adapted in any of its engaged or locking positions to be connected to the casement at two widely-separated points, the engaging or locking part being situated between said connected parts. The pivoted catch-arm is formed with an end extension adapted in the engaged position of the catch to engage with a hook-like or gapped part carried by the casement.

18,730 of 1907.—T. TAYLOR: *Packing of Tiles, Briquettes, Bricks, Slabs, and the like.*

This relates to means for packing and transporting tiles or briquettes, and consists in the use of trays or frames wherein each tile or briquette can be nested in a division and separated or packed therein by lacings or flexible division walls or separators which divide up the tray and form the nests or divisions wherein the tile or briquette can be laid, the linings being housed on the exterior walls and space provided by the lower inner edges of the sides, and ends of the frame being somewhat cut away or bevelled to prevent the angular edges of tiles or briquettes from encountering the upright walls of such points.

2,146 of 1908.—J. CARTER: *Metal Roof and Eaves Trough.*

This relates to roofing designed more especially for railway cars, though readily adaptable to dwellings and other structures to be protected from the weather, and consists in sheet-metal roofing comprising plates or sections, each plate or section having an end portion folded upon itself, thence bent outward at about a right angle to form a securing flange, and provided at opposite longitudinal edges with match rolls terminating in upstanding flanges, the rolls ending at the folded end of a plate and arranged upon the side thereof opposite to the securing flange; the several plates being adapted to be fitted together by slipping the rolls one within the other, and a sectional eaves trough having a horizontal wing to underlap the folded portion of the plates and a vertical wing to underlap the pendant portion of the roof plates and fastenings passed through the overlapped vertical portions of the roof plates and eaves trough sections to secure them to the roof structures.

3,898 of 1908.—P. J. E. CARON: *Locks for Doors of Water-closets, Bathrooms, and other Chambers.*

This relates to a lock for the doors of water-closets, bathrooms, and the like, the bolt of which is provided with a handle which projects from the outer side of the door when the room is not occupied, and can be moved through a slot in the door so as to project on the inside of the door when the said room is occupied so that no projections remain on the outer surface of the door, and wherein a plate serving as a mask and moved simultaneously with the bolt uncovers the slot for the passage of the handle when the bolt is moved backwards, and masks said slot when the room is occupied on moving the bolt forwards. The handle is so weighted and balanced that it passes through the slot in the door automatically.

7,003 of 1908.—N. C. COOKSON and COOKSON & CO., LTD.: *Window-sash Weights.*

This relates to the manufacture of counterbalance weights which are employed for balancing sliding window sashes and the like, consisting in forming a tube of lead of considerable length having thick walls and having a bore extending axially through the same of a diameter to allow of the passage of the suspending cord, the said lead tube being of known weight per foot run, and then cutting off from the said tube a length equivalent to the weight of the counterbalance weight required; and providing the length of lead tube with graduations representing pounds and fractions of pounds to facilitate the cutting off of a length of the required weight.

List of Competitions, Contracts, etc.

For some Contracts still open, but not included in this List, see previous issues. Those with an asterisk (*) are advertised in this Number: Competitions, iv.; Contracts, iv. vi. viii. x.; Public Appointments, xviii.; Auction Sales, xxviii.

Certain conditions, beyond those given in the following information, are imposed in some cases, such as: the advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bonâ-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

***** It must be understood that the following paragraphs are printed as news, and not as advertisements: and that while every endeavour is made to ensure accuracy, we cannot be responsible for errors that *may* occur.**

Competitions.

JUNE 15.—**Selly Park.**—SCHOOL.—King's Norton and Northfield U.D.C. Education Committee propose to provide a new Council school to accommodate 1,000 children on a site in Pershore-road, Selly Park, and the Committee have decided to invite architects resident or practising in Birmingham or within the Urban District of King's Norton and Northfield to submit competitive plans for the proposed school. A duly qualified assessor will be appointed. Architects desirous of submitting plans should send a formal request for instructions and other particulars to the Secretary to the Committee, Education Offices, King's Norton.

JULY 31.—**Banbury.**—SCHOOL.—Banbury Education Committee invite designs for a new public elementary school to be erected on a site within the Borough. Applications for particulars, accompanied by a deposit of 1*l.*, should be made to Mr. Oliver J. Stockton, Town Clerk, Town Hall, Banbury.

AUGUST 1.—**Guernsey.**—COUNTRY HOSPITAL.—Plans are being asked for the proposed building of an infirmary. For conditions and other information apply to the President of the Directors of the said Hospital, Mr. Thomas Robin.

* NO DATE. — **Aberystwyth.** — LIBRARY. — The Council of the National Library of Wales invite architects to submit designs for erection of the library buildings at Aberystwyth. See advertisement in this issue for further particulars.

* NO DATE.—**Merioneth.**—FREE LIBRARY.—Plans and specifications are invited for a Free Library (cost not to exceed 650*l.*) at Dolgelley, Merioneth. Premium 10*l.* See advertisement in this issue for further particulars.

Contracts.

BUILDING.

JUNE 15.—**Brighton.**—ADDITIONS TO SCHOOL.—The Brighton Education Committee invite tenders for certain alterations and additions to Pelham-street Council Schools, Brighton. Plans, etc., may be seen, and a copy of the bills of quantities obtained, at the offices of the Surveyors to the Committee, Messrs. T. Simpson & Son, 17, Ship-street, Brighton. A payment of 2*l.* will be required for each copy of the quantities.

JUNE 15.—**Cotford.**—COTTAGES.—Tenders are invited for the erection of two pairs of semi-detached cottages at Somerset and Bath Asylum, Cotford, near Taunton. Plans, etc., can be seen on application to the clerk of works at the asylum.

JUNE 15.—**Crick.**—ALTERATIONS, ETC., TO SCHOOL.—The Managers of Church of England Schools, Crick, Northamptonshire, invite tenders for alterations and additions at the Crick Schools, in accordance with drawings, etc., prepared by the architect, Mr. J. T. Blackwell, 53, High-street, Kettering.

JUNE 15.—**Moulton.**—ALTERATIONS, ETC., TO SCHOOL.—Cheshire C.C. Education Department (Administrative Sub-committee for the Northwich Union Area) invite tenders for alterations and improvements at Moulton Council School, near Northwich. Plans, etc., can be seen at the office of Mr. H. Beswick, County Architect, Newgate-street, Chester, and quantities obtained, on deposit of 1*l.*

JUNE 15.—**Quaker's Yard.**—HOUSES.—The erection of twenty houses on the Woodlands Estate, Quaker's Yard, for Messrs. the Woodlands Building Club. Plans, etc., may be seen at the office of Mr. William Dowdeswell, architect, Treharris.

JUNE 15.—**Wesham, Fylde.**—ENGINE-HOUSE.—The Guardians invite tenders for the erection of a small engine-house at the new Workhouse, Wesham. Plans may be seen, and quantities obtained, at the offices of the architects, Messrs. Haywood & Harrison, Accrington, or from Mr. Fred H. Brown, Clerk, Wesham.

JUNE 16.—**Barrow-in-Furness.**—CUPBOARDS, ETC.—The Corporation invite tenders for two cupboards, tables, etc., at the Boys' Secondary School. Further particulars and bills of quantities may be obtained upon application at the Borough Engineer's Office.

JUNE 16.—**Bradford.**—ALTERATIONS.—Alterations to drying closets at the Union Workhouse, Horton-lane, Bradford. Name, along with 1*l.* 1*s.* deposit, for specification, etc., to Mr. Fred Holland, Engineer and Architect, 22, Manor-row, Bradford.

JUNE 16.—**Bromsgrove.**—ALTERATIONS AT INFIRMARY.—Bromsgrove Guardians invite tenders for alterations and formations of bath-rooms for nurses and attendants at the Workhouse and Infirmary. Specifications may be seen at the offices of the architect, Mr. G. H. Gadd, Town Hall-chambers, Bromsgrove.

JUNE 17.—**Brynna.**—HOUSES.—Erection of thirty houses at Brynna, near Llanharan, for the Brynna Building Committee. Plans, etc., may be seen at the offices of the architect, Mr. James T. Jenkins, Porth, Rhondda, and also at the residence of the Secretary, Mr. W. A. Salter, Woodland, Pencoed, near Bridgend.

JUNE 17.—**Claremorris.**—CHURCH WORKS.—Stripping and newly slating the roofs, raking out and re-pointing walls, etc., at the new Parish Church, Claremorris, co. Mayo. Drawings, etc., may be seen at offices of Messrs. Walter Doolin & Butler, architects, Dawson-chambers, Dublin, and at the Parochial House, Claremorris.

JUNE 17.—**Derby.**—SHEFFIELD.—The Directors of the Midland Railway Company invite tenders for the erection of a carriage storing shed in timber, at Sheffield. Plans, etc., may be seen, quantities and particulars obtained, on application at the Engineer's Office, Derby Station.

JUNE 17.—**Morriston.**—PARISH HALL.—For new Parish Hall, Morriston. Particulars from Mr. C. S. Thomas, M.S.A., architect, Wind-street, Swansea. Quantities will be supplied on payment of a deposit of 1*l.* 1*s.*

JUNE 18.—**Ewloe Green.**—SCHOOL.—Flintshire Education Committee invite tenders for erecting a new Council elementary school at Ewloe Green, in accordance with plans, etc., prepared by the County Architect, Mr. Samuel Evans. Plans, etc., may be seen, and bills of quantities obtained, at the office of Mr. Samuel Evans, County Education Offices, Mold, on payment of 2*l.* 2*s.*

* JUNE 18.—**Middlesbrough.**—ADDITIONS, ETC.—Tenders are invited for alterations and additions to seventeen houses at St. George's-terrace, Linthorpe-road, Middlesbrough. See advertisement in this issue for further particulars.

JUNE 19.—**Armagh.**—RENOVATION OF TONTINE BUILDINGS FOR USE AS TOWN HALL.—The Armagh U.D.C. invite tenders for the renovation and improvement of Tontine Buildings, in accordance with plans and specifications prepared by Mr. John Caffrey, M.R.San.I., Armagh. The plans, etc., may be seen at office of Mr. James Lennon, Town Clerk, U.D.C. Offices, Armagh, where copies of the tender form, etc., may be obtained by making a deposit of 1*l.* 1*s.*

JUNE 19.—**Cumwhinton.**—MISSION HALL.—Erection of a stone mission hall at Cumwhinton, near Carlisle. Plans, etc., can be seen at Mr. Coulson's, Cumwhinton.

JUNE 19.—**Howden Clough.**—NEW SUNDAY SCHOOLS, HOWDEN CLOUGH, BIRSTALL.—Plans, etc., may be seen, and particulars obtained from Messrs. Walter Hanstock & Son, architects, Batley.

JUNE 19.—**Huddersfield.**—HOUSES.—Erection of eight dwelling-houses in Deighton-road. Plans may be seen, and bills of quantities obtained, at office of Mr. J. Berry, architect and surveyor, 3, Market-place, Huddersfield.

JUNE 19.—**Lochgelly.**—COTTAGES.—Mason, joiner, plumber, plaster, and slater work of proposed semi-detached cottages in Station-road, Lochgelly, for Mr. William Reekie, grocer, Thomson's-buildings, Auchterderran-road. Plans, etc., may be seen, and schedules of measurements obtained, on application to Mr. James T. Scobie, architect, Dunfermline and Lochgelly.

JUNE 20.—**Axminster.**—ROOF WORKS.—Restoration in panelled oak, covered with lead, of the south aisle roof of the Parish Church, Axminster. Plans and specification at offices of Messrs. E. H. Harbottle & Son, architects, County-chambers, Exeter.

JUNE 20.—**Edinburgh.**—LAVATORY.—The School Board invite estimates for providing additional lavatory accommodation at Boroughmuir Higher Grade School. Specifications can be obtained at the office of Mr. Carfrae, architect, 3, Queen-street.

JUNE 20.—**Perth.**—SCHOOL.—The School Board of the Burgh of Perth invite tenders for mason, carpenter and joiner, plumber, plaster, and tile slater, glazier, iron and steel, electric light wiring works, bells, and blinds in connexion with the erection of new Northern District School, Dunkeld-road. Schedules may be obtained, and plans, etc., seen, at the office of Mr. G. P. K. Young, A.R.I.B.A., 42, Tay-street, Perth. 1*l.* 1*s.* for each of the mason and joiner schedules, and 10*s.* 6*d.* for each of the other schedules, will be charged in the first instance.

JUNE 22.—**Kenfig Hill.**—COTTAGES.—The Pwll-y-Gath Building Club invite tenders for the erection of twenty-four cottages at Kenfig Hill. Plans, etc., may be seen at the offices of the architect, Mr. R. O. Clark, Station-road, Port Talbot.

JUNE 22.—**Uganda.**—SHEDS.—The Crown Agents for the Colonies, acting on behalf of the Administration of the Uganda Railway, invite tenders for the supply of import sheds. Specification, etc., can be obtained on application to the Crown Agents on payment of a deposit of 1*l.*

JUNE 23.—**Bristol.**—SCHOOL WORK.—The Bristol Education Committee invite separate tenders for the builders' and plumbers' work connected with the erection of a Council school at Sefton Park, Ashley Down. Drawings, etc., may be inspected, and (on payment of a deposit of 2*l.* 2*s.*) forms of tender, etc., may be obtained, at the office of the architects, Messrs. W. V. & A. R. Gough, 24, Bridge-street, Bristol.

* JUNE 23.—**Harold Wood.**—ALTERATIONS.—The West Ham B.C. invite tenders for alterations, etc., to premises known as The Grange, Harold Wood. See advertisement in this issue for further particulars.

JUNE 23.—**Manchester.**—CAR DEPOT.—Manchester Corporation Tramways Committee invite tenders for the general builders' work required in the erection of an electric car depôt and buildings at Princess-road, Manchester. Bills of quantities, etc., may be obtained on application to Mr. J. M. M'Elroy, General Manager, Tramways Department, 55, Piccadilly, Manchester, on deposit of 3*l.* 3*s.* Drawings may be seen, and all information obtained, at the office of Mr. J. Gibbons, architect, Parsonage-buildings, 4, St. Mary's Parsonage, Manchester.

JUNE 23.—**Oldham.**—EXTENSIONS TO WORKHOUSE, GENERAL INFIRMARIES, AND NURSES' HOME.—Tenders are required for the execution of the whole or of portions of the several works herein. Plans, etc., may be inspected, and quantities obtained, at the office of Mr. Thomas Taylor, architect, 29, Queen-street, Oldham.

JUNE 24. — **Dublin.** — TECHNICAL SCHOOL. — The Technical Education Committee invite tenders for the erection of a technical school at Bolton-street. Plans, etc., may be inspected daily at office of City Architect, Municipal Buildings, Cork-hill, Dublin. Copies of bills of quantities, etc., may be obtained at the office of the City Treasurer, Municipal Buildings, Cork-hill, Dublin, on payment of 2*l.*

JUNE 24.—**Fatfield.**—HOUSES.—Lambton Collieries, Ltd., invite tenders for the building of thirty-three houses at Fatfield, near Penshaw Station. Plans, etc., can be seen at the architect's office, Philadelphia Lime Depôt.

* JUNE 24.—**Homerton, N.E.**—ALTERATIONS.—The Metropolitan Asylums Board invite tenders for alterations to the Medical Superintendent's house at the Eastern Fever Hospital. See advertisement in this issue for further particulars.

* JUNE 25.—**Enfield.**—COTTAGES, STABLES, ETC.—The Enfield U.D.C. invite tenders for the erection of a pair of cottages, stables, and cartsheds. See advertisement in this issue for further particulars.

* JUNE 25.—**Gravesend.**—SCHOOLS.—The Gravesend T.C. invite tenders for Public Elementary Schools. See advertisement in this issue for further particulars.

JUNE 27.—**Derby.**—ALTERATIONS.—Derby Guardians invite tenders from Derby builders for alterations to the coal yard and vagrant ward ventilators at their Union Workhouse, Uttoxeter-road, Derby. Plans, etc., may be seen, and bill of quantities obtained, on application to Mr. F. C. Coulthurst, architect and valuer, 4, Albert-street, Derby.

JUNE 27.—**Sherburn-in-Elmet.**—REPAIRS, ETC., TO FARMHOUSE.—Repairs and alterations to Mattram Farmhouse, Biggin, about two miles from Sherburn-in-Elmet Station. Messrs. Perkins & Perkins, solicitors, Sherburn-in-Elmet, South Milford.

* JULY 2.—**Hull.**—EXTENSION OF TOWN HALL.—The Corporation of Hull invite tenders for erection of second portion of Town Hall extension. See advertisement in this issue for further particulars.

JULY 4.—**Lauder.**—CONVENIENCES.—Lauder T.C. invite tenders for erecting and fitting-up three public conveniences, of brick covered with slates, in the Under Back-road of the Burgh of Lauder. Mr. T. A. Atkinson, C.E., Earlston, will show the plans and specifications.

JULY 6.—**Twynyrodyn.**—ADDITIONS TO SCHOOLS.—Merthyr Tydvil Education Committee invite tenders for erecting seven additional classrooms and cookery-room, new cloakrooms, latrines, etc. Drawings, etc., may be seen at office of Mr. E. Stephens, Clerk, Town Hall, Merthyr Tydvil, and on application to the Committee's Architect, Mr. J. Llewellin Smith, M.S.A., from whom copies of the specification and bill of quantities may be obtained on deposit of cheque for 2*l.* 2*s.*

* JULY 10.—**Croydon.**—SCHOOL.—The Croydon Education Committee invite tenders for a secondary school for girls. See advertisement in this issue for further particulars.

NO DATE.—**Earby-in-Craven.**—CHURCH.—The erection of new church, Earby-in-Craven. Bills of quantities from Messrs. Bromet & Thorman, architects, Tadcaster.

NO DATE.—**Tyldesley.**—LIBRARY.—Tyldesley U.D.C. invite tenders for the erection and completion of new Library in Stanley-street, Tyldesley. Deposit of 1*l.* 1*s.* Mr W. J. Matthews, Clerk, Council Offices, Tyldesley.

ENGINEERING, IRON, AND STEEL.

JUNE 15.—**Bristol.**—HEATING.—The Bristol Education Committee invite tenders for the reconstruction of the heating apparatus at the Moorfields Boys' and Girls' Council School, St. George. The drawings, etc., may be inspected, and a copy of the specification obtained, at the office of Mr. Peter Addie, Exchange, Corn-street, Bristol.

JUNE 17.—**London.**—FENCING.—The East Indian Railway Company invite tenders for the supply and

delivery of steel palisade fencing, as per specification to be seen at the offices of Mr. C. W. Young, Secretary, Nicholas-lane, London, E.C. For each specification a fee of 1*l.* 1*s.* is charged, which cannot under any circumstances be returned.

JUNE 19.—**Manchester.**—MOTORS.—The Electricity Committee of the Manchester Corporation invite tenders for the supply of:—(*a*) Direct current motors; (*b*) direct current motor starters; (*c*) ampere-hour and watt-hour meters; (*d*) fuse-boxes. Specifications, etc., may be obtained on application to Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall, Manchester.

JUNE 19. — **Manchester.** — WELL. — Manchester Corporation Waterworks Committee invite tenders for boring and lining a deep well at their Whitworth-street West Pumping Station. Specification, etc., will be supplied by the Secretary, Waterworks Offices, Town Hall, Manchester, and any other information may be obtained on application to the Engineer at Whitworth-street West Pumping Station.

JUNE 20. — **Sheringham.** — CONCRETE RETAINING WALL.—Sheringham U.D.C. invite tenders for concrete retaining wall and raised promenade within their district. Plans, etc., may be seen, and bills of quantities, etc., obtained, on application at the office of Mr. Frank Hall Smith, Railway-road, Sheringham, Surveyor to the Council, on deposit of 2*l.*

JUNE 22.—**Avonmouth, Bristol.**—GRAVING DOCK BLOCKS.—The Docks Committee of Bristol invite tenders for graving dock blocks for the graving dock in connexion with the Royal Edward Dock, now in course of construction at Avonmouth. Specification, etc., may be obtained from Mr. W. W. Squire, Engineer, Engineer's Office, Cumberland Basin, Bristol, on production of a receipt showing that a deposit of 3*l.* has been paid to the Secretary of the Docks Committee, 19, Queen-square, Bristol.

JUNE 22. — **Ilford.** — HEATING AND VENTILATING.—Ilford U.D.C. invite tenders for the installation of a low-pressure hot-water heating system and ventilation at the Library and Public Hall, Seven Kings, Ilford. Drawings, etc., can be obtained at the offices of Mr. Herbert Shaw, M.Inst. C.E., Engineer and Surveyor, Town Hall, Ilford, on payment of a deposit of 2*l.* 2*s.*

JUNE 23. — **Bedminster.** — HEATING, ETC.—Bristol Education Committee invite tenders for the heating and ventilating of the Council school now in course of erection at Merrywood, Bedminster. Conditions of contract may be inspected, and (on payment of a deposit of 1*l.* 1*s.*) copies of the drawings, etc., may be obtained, at the office of the architect, Mr. H. Dare Bryan, F.R.I.B.A., 4, Unity-street, College Green, Bristol.

JUNE 23. — **Bristol.** — HEATING, ETC. — The Bristol Education Committee invite tenders for the heating and ventilating of the Council school to be erected in Sefton Park, Ashley Down. Conditions of contract and the drawings may be inspected, and (on payment of a deposit of 1*l.* 1*s.*) bills of quantities may be obtained, at the office of the architects, Messrs. W. V. & A. R. Gough, 24, Bridge-street, Bristol.

JUNE 23.—**Croydon.**—HEATING, ETC.—Croydon Corporation invite tenders for heating the swimming bath in Scarbrook-road, Croydon. Plans, etc., can be obtained at the office of the Borough Engineer, Town Hall, Croydon, upon payment of a deposit of 1*l.* 1*s.*

JUNE 23. — **Ilford.** — ELECTRIC LIGHTING. — Ilford U.D.C. invite tenders for electric lighting in connexion with Seven Kings Library and Hall. Specifications can be obtained, and plans seen, at the offices of Mr. Arthur H. Shaw, M.Inst.E.E., Electricity Works, Ley-street, Ilford.

JUNE 23.—**Tooting.**—CYLINDERS.—The Metropolitan Asylums Board invite tenders for new hot-water storage cylinders, etc., at Tooting Bec Asylum, Tooting, S.W. The drawings, etc., may be inspected at the office of the Board, Embankment, E.C., and can be obtained upon payment of a deposit of 2*l.*

JULY 4.—**Portadown.**—PUMP.—Portadown U.D.C. invite tenders for a pump capable of lifting and delivering about 13,000 gallons of sewerage per hour. For particulars apply to Mr. William Wilson, Town Surveyor, Town Hall, Portadown.

SEPTEMBER 10.—**Gold Coast (Accra).**—GOVERNMENT RAILWAY.—The Crown Agents for the Colonies invite tenders for the construction of a railway of a length of about thirty-nine miles, from Accra to Mangoussi. Plans, etc., may be seen by intending contractors at the office of the Crown Agents in London between the hours of 10 a.m. and 4 p.m. (Saturdays, 10 to 1).

NO DATE. — **Stranorlar.** — TURNTABLES. — County Donegal Railways Joint Committee invite tenders for the constructions and delivery of two turntables for 3-ft. gauge railway, each to be 35 ft. in diameter. Further particulars may be had on application to the Engineer, County Donegal Railways Joint Committee, Stranorlar, County Donegal.

MISCELLANEOUS.

JUNE 16. — **Mountain Ash.** — GRAVE-MARKERS. — Mountain Ash U.D.C. invite tenders for the supply and delivery of 6,000 grave-markers. Mr. H. P. Linton, Clerk, Town Hall, Mountain Ash.

JUNE 17. — **Bexley.** — ROAD-WATERING HYDRANTS. — Bexley U.D.C. invite tenders for metering existing hydrants and for metering and providing and fixing new hydrants. A plan, showing positions, may be seen, and particulars and form of tender obtained, at the office of Mr. W. T. Howse, Surveyor to the Council.

JUNE 17. — **Cranbrook.** — STEAM ROLLING. — Cranbrook R.D.C. invite tenders for steam rolling and scarifying during the ensuing season. Forms of tender must be obtained of Mr. T. H. Crampton, Clerk, Cranbrook.

JUNE 17. — **Westminster.** — MOTOR WAGONS.—The Westminster City Council invite tenders (*a*) for the supply and maintenance of one or more, but not exceeding four, motor tip wagons fitted with interchangeable dust and water bodies; and (*b*) for the maintenance of wagons for working both day and night for five years. Particulars, etc., may be obtained on application at the Town Clerk's office, Westminster City Hall, Charing Cross-road, W.C.

JUNE 18.—**Fulham.**—TIMBER.—The Guardians invite tenders for the supply of 60 fathoms of board or pole ends. Forms of tender may be obtained at office of Mr. E. J. Mott, Clerk to the Guardians, Guardians' Offices, 129, Fulham Palace-road, Hammersmith.

JUNE 18.—**Sligo.**—MOORING BUOYS.—The Sligo Harbour Commissioners invite tenders for two mooring buoys, chain cables, and sinkers, in accordance with drawings, etc., which may be obtained from Mr. Thos. J. Mercer, Secretary, Harbour Office, Sligo, on payment of 1*l.* (not returnable).

JUNE 20.—**Evington.** — HOUSE SCAVENGING. — The R.D.C. invite tenders for the removal of house refuse and the cleansing of earth closets, privies, ashpits, and cesspools. Particulars of the work may be obtained from Mr. G Harrison, Thornby, or from Mr. W. E. Richardson, Clerk, 18, New-street, Leicester.

JUNE 23.—**Croydon.**—LIGHTING.—For lighting the swimming-bath in Scarbrook-road, Croydon. Plans, etc., can be obtained at the office of the Borough Engineer, Town Hall, Croydon, upon payment of a deposit of 1*l.* 1*s.*

JUNE 23.—**Hoddesdon.**—STREET LIGHTING.—Hoddesdon U.D.C. invite tenders for the painting of the street lamps, lamp columns, and brackets throughout the district. Further particulars and forms of specification, etc., may be obtained of the Surveyor, Mr. W. H. Flood, Council Offices, Hoddesdon.

JUNE 23.—**South Hetton.**—ACETYLENE GAS.—Haswell P.C. invite tenders for the extension of an acetylene gas installation at South Hetton Colliery. Plans, etc., may be seen by appointment. Mr. Thomas Gustard, Clerk, Township Office, Haswell, Sunderland.

JUNE 29. — **Droxford.** — STEAM ROLLERS, ETC. — The R.D.C. of Droxford invite tenders for the hire of steam rollers and scarifiers. Forms of tender, etc., may be obtained of Mr. H. Godfrey Pearson, Clerk, Bishop's Waltham, Hants, or of Mr. A. V. Carter, District Surveyor, Droxford, Hants.

NO DATE. — **Bolton.**—REPOINTING.—Repointing the tower of All Souls' Church, Bolton. Address, Wardens, Astley-street.

NO DATE.—**Doncaster.**—SINKING PITS.—Sinking a pair of pits near Doncaster to the Barnsley Bed; depth approximately 650 yds. For full particulars apply to Mr. William Humble, Oxcroft Colliery, Bolsover, Chesterfield.

NO DATE.—**Nottingham.**—CARTING.—Carting from Clifton Colliery to Wilford. For particulars apply Messrs. Calvert & Gleave, architects, 18, Low-pavement, Nottingham.

PAINTING, etc.

✱ JUNE 10.—**Homerton, N.E.**—CLEANING, PAINTING, ETC.—The Metropolitan Asylums Board invite tenders for cleaning and painting works at the Fever Hospital. See advertisement in this issue for further particulars.

JUNE 15.—**Barnstaple.**—PAINTING.—Painting and colouring the internal parts of the National Girls' School, North Walk. A specification of the work can be seen at the office of the Borough Surveyor, The Strand, Barnstaple.

JUNE 15.—**Bristol.**—PAINTING, ETC.—Bristol Education Committee invite tenders for the painting, colouring, etc., of certain schools. Specifications, etc., may be obtained from Mr. Peter Addie, Exchange, Corn-street, Bristol, on payment of a deposit of 1*l.* 1*s.*

JUNE 15. — **Brumby.** — PAINTING. — Brumby and Frodingham U.D.C. Burials Committee invite tenders for painting at the cemetery, full particulars of which can be obtained from Mr. J. Green, Surveyor, Council Offices, Frodingham.

✱ JUNE 15.—**Dartford, Kent.**—PAINTING, CLEANING, ETC.—The Metropolitan Asylums Board invite tenders for painting and cleaning works at the Darenth Asylum. See advertisement in this issue for further particulars.

JUNE 15. — **Portsmouth.** — PAINTING, ETC.—Portsmouth Education Committee invite tenders for painting and cleaning certain schools in accordance with a specification prepared by the Surveyor, Mr. A. H. Bone. Form of tender and all information may be obtained from the Surveyor at his office, Cambridge Junction, Portsmouth.

JUNE 15. — **Wolverhampton.** — PAINTING. — For painting and colouring at several schools. Particulars, etc., may be obtained on application to Mr. T. H. Fleeming, Architect to the Committee, 10, Queen-square, Wolverhampton.

JUNE 15.—**Worcester.**—PAINTING.—The Corporation invite tenders for internal painting, etc., to schools. Specifications to be seen, and forms obtained, at office of Mr. Alfred G. Parker, City Architect, 5, Foregate-street, Worcester.

JUNE 16.—**Carlisle.**—PAINTING.—Carlisle Education Committee invite tenders for painting and other works required to be done at four of the Elementary Schools. Specification, etc., may now be obtained from Mr. Henry C. Marks, M.Inst.C.E., surveyor, 36, Fisher-street, Carlisle, on payment of 10*s.* 6*d.*

JUNE 16.—**East Ham.**—CLEANING AND DISTEMPERING.—Tenders are invited for cleansing and distempering work at Essex-road, Lathom-road, and New Beckton Council Schools, and Silvertown Roman Catholic School; and for cleansing and whitewashing the latrines and urinals at sixteen schools. Specifications may be seen, and forms of tender obtained at the Education Office, Wakefield-street, East Ham.

JUNE 16.—**Guildford.**—PAINTING.—The Education Authority invite tenders for painting the Sandfield Schools and Nos. 75 and 76, Stoke-road. A specification may be seen, and particulars obtained, on application to Mr. C. G. Mason, A.M.Inst.C.E., the Surveyor to the Education Authority, at his office in Tuns Gate.

JUNE 16. — **Holywell Green.** — PAINTING. — For painting the exterior of church, school, parsonage, caretaker's house, and all out-buildings, Holywell Green Congregational Church. Specifications may be obtained at the parsonage.

JUNE 16.—**Hunslet.**—PAINTING, ETC.—Hunslet Guardians invite tenders (1) for the painting and lime and colour washing required at the Union Offices, Hunslet, and (2) for the erection of wrought-iron fencing on the eastern boundary of their Workhouse Estate at Rothwell Haigh. Separate forms of tender, etc., may be obtained on application at office of Mr. Fred W. Mee, Clerk to the Guardians, Union Offices, Hunslet, Leeds.

JUNE 16.—**Nottingham.**—INTERNAL PAINTING, FREE LIBRARY, SHERWOD-STREET.—The Public Libraries and Museum Committee invite tenders for this work. Copies of the specifications, bills of quantities, etc., may be obtained from Mr. Frank B. Lewis, City Architect, Guildhall, on payment of a deposit of 1*l.* 1*s.*

JUNE 17. — **Isleworth.** — PAINTING. — Brentford Guardians invite tenders for cleaning, painting, and distempering, etc., certain portions of the interior of the Infirmary Buildings at Isleworth. Specification can be seen at offices of Mr. William Stephens, Clerk to the Guardians, Union Offices, Isleworth, W.

JUNE 17. — **Redruth.** — PAINTING. — Redruth and Camborne District Education Committee invite tenders for the work of painting or staining to be done at the following schools:—St. Agnes, Beacon, Blackwater, Cusgarne, St. Day, East End, Kehelland, Lanner, Mount Hawke, Mithian, Nancekuke, and Stythians. Specifications may be seen at the Education Office, Redruth.

JUNE 18.—**Fulham.**—PAINTING, ETC.—The Guardians invite tenders for painting and decorating work required to be done at the Receiving Home for Children, 9, Parson's-green, Fulham. Form of tender, etc., can be obtained on application at office of Mr. E. J. Mott, Clerk to the Guardians, Guardians' Offices, 129, Fulham Palace-road, Hammersmith, W., or by forwarding a stamped addressed foolscap envelope.

JUNE 18.—**Hollingbourn.**—PAINTING.—The R.D.C. invite tenders for external painting of the Hollingbourn Infectious Hospital, and for painting of post and rail fence at Bunce Court-road, Otterden. Specifications can be seen at the offices of the Council, 33, Earl-street, Maidstone.

JUNE 18.—**Hull.**—PAINTING.—Hull Education Committee invite tenders for painting externally thirteen of their schools, and for colouring and whitewashing eleven others. Particulars and forms of tender can be obtained at offices of Mr. J. T. Riley, Secretary of Education, Education Offices, Albion-street, Hull.

JUNE 18. — **Southwark.** — PAINTING. — Southwark Guardians invite tenders for painting and other works to the Administrative Block and "G" and "H" Wards at their Infirmary, East Dulwich-grove, S.E. The specification, etc., may be obtained at the offices of their architect, Mr. Arthur J. Wade, 104, Harvist-road, Kilburn, N.W., on payment of 2*l.* 2*s.*

JUNE 19.—**Lynn.**—CLEANING SCHOOLS.—King's Lynn Elementary Education Committee invite tenders for the work of cleaning and colouring the interior of the South Lynn All Saints' Schools. For specifications, etc., apply to the Secretary, Education Office, King's Lynn.

JUNE 20.—**Belfast.**—PAINTING.—Belfast Tramways and Electricity Department invite tenders for painting tramway poles and feeder pillars. Form of tender, etc., may be obtained from Mr. Thomas W. Bloxam, City Electrical Engineer, on payment of 1*l.* 1*s.*

JUNE 20. — **Edinburgh.** — PAINTING. — Edinburgh School Board invite estimates for painter work at various schools. Specifications can be obtained at the office of Mr Carfrae, architect, 3, Queen-street.

JUNE 20.—**Preston.**—PAINTING.—Tenders are invited for labour and material for painting asylum buildings, farms, workshops, railway-stations, new hospital, sanatorium, greenhouses, sheds, etc., County Asylum, Whittingham, near Preston. Separate tenders required for labour and material. Specifications and forms of tender may be had from Mr. Thomas Dilworth, Clerk and Steward.

JUNE 20.—**Whittingham.**—PAINTING.—Tenders are invited for labour and material for painting asylum buildings, farms, workshops, railway-stations, new hospital, sanatorium, greenhouses, sheds, etc., County Asylum, Whittingham, near Preston. Specifications and forms of tender may be had from Mr. Thomas Dilworth, Clerk and Steward.

✱ JUNE 22.—**Kingston-on-Thames.**—PAINTING.—The Guardians of the Kingston Union invite tenders for internal painting, etc., to the nurses' home and bath and duty rooms at the Infirmary, also external painting to five houses, London-road, and two houses, Elm-road, and the Children's Central Homes. See advertisement in this issue for further particulars.

JUNE 23. — **Derby.** — PAINTING.—Derby Plant and Stores Committee invite tenders from local painters for exterior painting at the Corporation Depôt, Nottingham-road. Specification may be seen, and form of tender, etc., obtained, upon application at office of Mr. John Ward, M.Inst.C.E., Borough Surveyor, Borough Surveyor's Office, Babington-lane, Derby.

JUNE 23.—**West Ham.**—PAINTING.—The B.C. invite tenders for painting, cleansing, repairs, etc., of public buildings. Specification, etc., may be obtained at the office of Mr. John G. Morley, Borough Engineer, Town Hall, West Ham, E., upon payment of 1*l.*

JUNE 30.—**Beverley.**—PAINTING.—East Riding of Yorkshire C.C. Education Committee invite tenders for the painting and cleaning of certain schools in the Riding. A list of the schools intended to be painted or cleaned may be obtained on application to Mr. John Bickersteth, Clerk to the East Riding Education Authority, County Hall, Beverley.

JUNE 30.—**Edinburgh.**—PAINTING.—Painter work at George Heriot's School, the Heriot-Watt College, and the Trust Offices. Specifications, etc., may be obtained from Mr. John Anderson, Superintendent of Works.

✱ JUNE 30.—**Leyton.**—CLEANSING, PAINTING, ETC.—The Leyton U.D.C. invite tenders for cleansing, painting, repairs, and alterations to schools during summer vacation. See advertisement in this issue for further particulars.

NO DATE.—**Bolton.**—PAINTING, ETC.—Tenders are invited for painting and beautifying in accordance with specifications which may be obtained from Mr. H. I. Cooper, Clerk to the Guardians, 28, Mawdsley-street, Bolton.

No DATE.—**Newport.**—PAINTING.—Newport and Monmouthshire Hospital Committee invite tenders for painting work at the Hospital. The particulars of the work may be obtained upon application at the Hospital Offices, Cardiff-road. Mr. J. K. Millward, Secretary Superintendent.

ROADS, SANITARY, AND WATER WORKS.

JUNE 15.—**Allonby and Westnewton.**—WATER SUPPLY.—The R.D.C. of Wigton invite tenders for Allonby and Westnewton water supply (two contracts). Specifications, etc., may be obtained from Mr. J. F. W. Ritson, Clerk to the said Council, Wigton, on deposit of 2*l.* (cheque only).

JUNE 15.—**Brill.**—TAR PAVING.—Long Crendon R.D.C. invite tenders for supplying and laying at Brill, Bucks, about 450 super. yds. of limestone tar paving and 576 ft. run blue Staffordshire kerb. Specifications prepared by the Surveyor, Mr. Arthur J. Webb, Long Crendon, Thame, from whom quantities may be obtained.

JUNE 15.—**Bristol.**—PLAYGROUNDS.—The Bristol Education Committee invite tenders for relaying and relacing playgrounds of the Council schools. Copies of the specifications may be obtained from Mr. Peter Addie, Exchange, Corn-street, Bristol.

JUNE 15.—**Chorley.**—HEAPEY WATER SCHEME.—The R.D.C. of Chorley invite tenders for the laying of cast-iron water mains, with valves, hydrants, etc. Particulars may be obtained (on deposit of 1*l.*) at the office of Mr. Alban Jolly, Surveyor to the Council, at 9, High-street, Chorley.

JUNE 15.—**Edinburgh.**—DRAINS, ETC.—The Magistrates and Council invite offers for the construction of new main drains for the slaughter-houses and cattle markets, Slateford. Plans, etc., prepared by the Burgh Engineer, from whom schedules of measurement may be obtained.

JUNE 15.—**Loanhead.**—PAVEMENTS.—The T.C. of the Burgh of Loanhead invite tenders for the construction of concrete foot pavements within the Burgh. Drawings may be seen, and copies of the specification, etc., may be obtained, at the office of Mr. George Somervel Carfrae, C.E., 1, Erskine-place, Edinburgh, on payment of 1*l.*

JUNE 16.—**Gateshead.**—PAVING.—Tenders are invited for paving, etc., the following streets, viz.:—(1) West Park-road widening; (2) Dryden-road footpath; (3) back Rawling-road, between Faraday-grove and Kelvin-grove. Plans, etc., may be seen, and quantities obtained, at the office of Mr. N. P Pattinson Borough Engineer, Town Hall, Gateshead.

JUNE 16.—**Llanelly.**—SEWERING, ETC.—Tenders are invited for laying sewers and forming roads on Tyisha Estate, Llanelly. Mr. W. J. Rees, The Laurels, Swansea.

JUNE 16.—**Truro.**—SEWERING.—The R.D.C. of Truro invite tenders for the execution of the works necessary for the sewerage and sewage disposal of Grampound-road. Plans, etc., may be seen, and quantities, etc., obtained, at the office of Mr. R. Hansford Worth, Engineer for the Works, 42, George-street, Plymouth, or at office of Mr. Fras. Truscott, Clerk of the said Council, Truro, 7, Pydar-street, Truro.

JUNE 17.—**Birmingham.**—SEWER.—Birmingham Public Works Committee invite tenders for the construction of 360 yds. of brick and pipe surface-water sewer in Portland-road, together with storm overflow, manholes, lamphole, and other incidental works. Plans, etc., may be seen, and quantities and forms of tender obtained, at the office of Mr. Henry E. Stilgoe, M.Inst.C.E., City Engineer and Surveyor, the Council House, Birmingham, on deposit of the sum of 2*l.*

JUNE 17.—**Birmingham.**—STREET WORKS.—Birmingham Public Works Committee invite tenders for street improvement works in Alum Rock-road from Shaw Hill-road to railway near Belcher's-lane. The drawings, etc., may be seen, and quantities and form of tender obtained, at the office of Mr. Henry E. Stilgoe, M.Inst.C.E., City Engineer and Surveyor, the Council House, Birmingham, on deposit of the sum of 2*l.*

JUNE 17.—**Chiswick.**—SEWAGE-DISPOSAL WORKS.—The U.D.C. of Chiswick invite tenders for alterations and extensions of sewage-disposal works. Mr. Ernest F. Collins, Clerk of the Council, Town Hall, Chiswick, W.

JUNE 17.—**Glyncorrwg.**—STREET WORKS.—Glyncorrwg U.D.C. invite tenders for paving, kerbing, channelling, drainage, forming, and metalling roadways of Mathew-street, part Melyn-street, part Hoely-Coed, Bryn-road, Brick-street, part Dunraven-street, back lanes of Mathew-street, and Melyn-street. Plans, etc., may be seen, and forms of tender obtained, at the Surveyor's Department, Council Offices, Cymmer, Port Talbot, upon depositing 1*l.* 1*s.*

JUNE 18.—**Hackney.**—ROADMAKING.—Hackney B.C. invite tenders for the kerbing, channelling, paving, making-up, etc., of Moundfield-road (Clapton Common). The general conditions of contract, etc., may be inspected, and copies of the bill of quantities, etc., obtained, on application to Mr. Norman Scorgie, M.Inst.C.E., Borough Engineer and Surveyor, and on payment of the sum of 1*l.* 1*s.*

JUNE 19.—**Tonypandy.**—REPAIRS OF PLAYGROUNDS, ETC.—Rhondda U.D.C. invite tenders for repairs to playgrounds and footpaths at the mixed and infants' departments of the Tonypandy Council School. Plans, etc., may be seen, and bills of quantities, etc., obtained, at the office of the architect, Mr. Jacob Rees, Hillside Cottage, Pentre, upon the production of a receipt from the Accountant of the Council for the required deposit of 1*l.* 1*s.*

JUNE 20.—**Harrow.**—STREET WORKS.—Harrow-on-the-Hill U.D.C. invite tenders for the making-up of the following private streets:—Butler-road (part 3), Butler-road (part 4), Colbeck, Drury, Lance, Sumner, and Wargrave roads. Drawings may be seen, and specifications, etc., obtained, from Mr. J. Percy Bennetts, Engineer and Surveyor to the Council, on a deposit of a 5*l.* Bank of England note.

JUNE 20.—**Rodley, Calverley.**—SEWER.—Calverley U.D.C. invite tenders for about 600 yds. of 12-in. pipe sewers at Rodley. Quantities may be obtained from Mr. W. Walker, Surveyor, Council Offices, Calverley.

JUNE 22.—**Edinburgh.**—PIPEWORK.—Edinburgh Corporation invite tenders for the supply of wrought-iron riveted pipework. The specification, etc., can be obtained at the Engineer's Office, Dewar-place, Edinburgh, on payment of a deposit of 1*l.* 1*s.*

JUNE 23.—**Islington.**—ASPHALT PAVING.—The Metropolitan Borough of Islington invite tenders for paving with compressed asphalt a portion of Drayton-park and Benwell-road, at present macadamised. Conditions, etc., may be seen, and form of tender, etc., obtained, upon application to the Borough Engineer, Mr. J. Patten Barber, at the Town Hall, Upper-street, N., upon payment of 2*l.* 2*s.*

JUNE 23.—**Lewisham.**—KERBING, ARTIFICIAL STONE PAVING, METALLING, AND CHANNELLING WORKS.—Channelling, etc., Penerley-road, Catford, Hazeldon-road (part of), and the road in continuation of Eddystone-road, Brockley. The plans, etc., may be seen, and forms of tender obtained, at the Town Hall, Catford (Surveyor's Department). Copies of the specification may also be had on payment of the sum of 5*s.* in each case, which will not be returned.

* JUNE 23.—**Putney.**—PIPE SEWER.—The Wandsworth B.C. invite tenders for reconstruction of about 514 ft. of 12-in. pipe sewer (encased in concrete), etc., at Ashlone-road, Putney. See advertisement in this issue for further particulars.

JUNE 23.—**Scunthorpe.**—MAKING STREETS.—Certain streets, etc., on the west of Frodingham-road, on the Parkinson Estate, in Scunthorpe. Plans, etc., will be deposited at the office of Messrs. Thompson & Wood, in Scunthorpe, and any further information can be obtained from Mr. G. B. Walker, Wainfleet.

JUNE 23.—**Sutton Bonington.**—SEWERAGE WORKS.—Leake R.D.C. invite tenders for the sewerage and sewage disposal for the Parish of Sutton Bonington. Plans may be seen at the office of the engineers, Messrs. Sands & Walker, Milton-chambers, Nottingham, and copies of conditions, etc., can be obtained on deposit of 3*l.* 3*s.*

* JUNE 24.—**New Cross.**—TAR PAVING.—The Metropolitan Asylums Board invite tenders for tar paving, etc., at the South-eastern Fever Hospital. See advertisement in this issue for further particulars.

* JUNE 24.—**Sevenoaks.**—RESERVOIR.—The Sevenoaks R.D.C. invite tenders for a covered service reservoir at Otford. See advertisement in this issue for further particulars.

JUNE 27.—**Horwich.**—TAR MACADAM.—Horwich U.D.C. invite tenders for about 500 tons of tar macadam, ready for laying, to be delivered at Horwich Station. Specification, etc., can be obtained on application to the Surveyor, Mr. Thos. Green, Council Offices, Horwich.

* JUNE 29.—**Brentford.**—EXTENDING SEWAGE BEDS.—The Brentford U.D.C. invite tenders for extending the beds at their Sewage Works. See advertisement in this issue for further particulars.

JUNE 29.—**Connah's Quay.**—FILTERS AND RESERVOIR.—The Connah's Quay Gas and Water Company, Ltd., invite tenders for the construction of filters and a reservoir and other works at the Waterworks, Connah's Quay, Flintshire. The drawings, etc., may be seen at the office of the Engineer, Mr. Frank E. Priest, M.Inst.C.E., 13, Harrington-street, Liverpool, from whom copies of the specification, etc., may be obtained on deposit of 2*l.* 2*s.*

JUNE 29.—**Haslemere, Surrey.**—EXTENSION OF SEWERAGE AND SEWAGE-DISPOSAL WORKS.—The Hambledon R.D.C. invite tenders for the laying of about 1,500 yds. of stoneware and cast-iron pipes and building the necessary manholes, and for forming bacteria beds and storm filtration area, and laying out and underdraining an irrigation area. The drawings, etc., can be seen, and schedules of quantities, etc., obtained, at the offices of Messrs. R. B. Grantham & Son, 5, Little College-street, Westminster Abbey, S.W., on payment of a deposit of 3*l.* 3*s.*

JULY 1.—**Calcutta.**—CONSTRUCTION OF NINE MILLION GALLON RAISED STEEL RESERVOIR.—The Commissioners of the Corporation of Calcutta invite tenders for the construction of a raised steel tank or reservoir. Detailed plans, etc., may be obtained at the office of the "Indian and Eastern Engineer," 50, Fenchurch-street, London, E.C., on payment of 20*l.*

JULY 1.—**Pleasley.**—SEWAGE WORKS.—Blackwell R.D.C. invite tenders from competent contractors for the construction of sewage disposal works at Pleasley. The drawings, etc., may be seen at the offices of the engineers, Messrs. Vallance & Westwick, White Hart-chambers, Mansfield, and schedule of quantities, etc., obtained on the deposit of 3*l.* 3*s.*

JULY 3.—**Penrith.**—CONSTRUCTION OF WATERWORKS.—Penrith U.D.C. invite tenders for Contract No. 1.—The construction of a rubble masonry dam across the outlet from Hayeswater. Contract No. 2.—The casing of the existing low-level service reservoir at Penrith, the construction of an additional high-level covered service reservoir, etc. Plans, etc., may be seen, and forms of tender obtained, at the office of Mr. Baldwin Latham, M.Inst.C.E., Parliament-mansions, Victoria-street, Westminster, S.W., the engineer of the works, or on application to Mr. George Wainwright, Clerk to the Penrith U.D.C., Penrith. A copy of the specification, etc., together with a form of tender, may be had on application to the Engineer, or to the Clerk, on deposit of 10*l.* for each contract.

* JULY 6.—**Netley.**—ALTERATIONS AND DRAINAGE.—The Director of Army Contracts invites tenders for certain alterations and drainage work to main hospital of Royal Victoria Hospital, Netley. See advertisement in this issue for further particulars.

* JULY 7.—**Brentford.**—MAKING-UP ROADS.—The Brentford U.D.C. invite tenders for making-up certain roads. See advertisement in this issue for further particulars.

STONE, MATERIALS, AND STORES.

JUNE 15.—**Bristol.**—LEAD PIPE AND PLUMBERS' SUNDRIES.—The Sanitary and Improvement Committee of the Corporation invite tenders for the supply of lead pipe and plumbers' sundries. A copy of the specification and form of tender may be obtained at the offices of the City Engineer, 53, Queen-square, Bristol, on payment of 10*s.*

JUNE 15.—**Dover.**—STORES.—Dover T.C. invite tenders for the supply of stores, materials, and labour. Forms of schedule, etc., can be obtained at office of Mr. R. E. Knocker, Town Clerk, Town Clerk's Office, Castle Hill House, Dover.

JUNE 15.—**Royton.**—STONE.—The U.D.C. of Royton invite tenders for the next twelve months' supply of kerbs, flags, and grit, and non-slippery granite setts. Specification, etc., may be obtained on application to Mr. Thos. Bleasdale, Clerk to the Council, Town Hall, Royton.

JUNE 15.—**Ware.**—GRANITE.—Ware Guardians invite tenders for the supply of 140 tons of Guernsey granite spalls. Mr. Geo. H. Gisby, Clerk to the Guardians, Ware, Herts.

JUNE 16.—**Aldershot.**—MACADAM.—Aldershot U.D.C. invite tenders for supplying 400 tons 2-in. basalt macadam f.o.r. Aldershot Town Station. Forms of tender may be had upon application to Mr. Fred. C. Uren, Surveyor.

JUNE 20.—**Leeds.**—GAS OIL.—Leeds Corporation Gas Committee invite tenders for the supply of 2,000 tons of gas oil, for the manufacture of carburetted water gas. Specification, etc., may be obtained on application to Mr. R. H. Townsley, General Manager, Gas Offices, East-parade, Leeds.

JUNE 20.—**Lewes.**—STONE.—Lewes T.C. invite tenders for the supply of 700 tons of 2-in. broken granite, 250 tons of coarse granite screenings, and 500 tons of broken surface-picked flints. Forms of tender, etc., may be had, and any further information obtained, at the Borough Surveyor's Office, Town Hall, Lewes.

JUNE 20.—**Manchester.**—GRANITE.—The Paving, Sewering, and Highways Committee of the Manchester Corporation invite tenders for supply of—(*a*) 4,000 tons 3-in. by 6-in. granite setts; (*b*) 1,000 tons 4-in. by 6-in. granite setts; (*c*) 1,500 tons ½-in. granite chippings; (*d*) pitch and creosote oil. Forms of tender may be obtained on application to the Chief Clerk, Paving, etc., Department, Town Hall, Manchester.

JUNE 20.—**Trimdon.**—TIMBER, ETC.—The Trimdon Coal Company invite tenders for the supply of timber, oils, grease, and general stores, etc. For forms of tender application to be made to Mr. I. Penney, Deaf Hill Colliery, Trimdon Grange, S.O.

JUNE 20.—**Wakefield.**—ROAD MATERIALS.—The Corporation invite tenders for the supply and delivery at Wakefield of granite or whinstone macadam, slag, stone setts, pitch, creosote oil, and stone flags. Forms of tender, etc., may be obtained from the City Surveyor.

JUNE 22.—**Leeds.**—ARTICLES.—The Gas Committee of the Leeds Corporation invite tenders for supply of articles for twelve months. Samples of the various articles may be seen at the Stores Office, Meadow-lane, and forms of tender obtained on application to Mr. R. H. Townsley, General Manager, Gas Offices, Leeds.

JUNE 23.—**Hemel Hempsted.**—MATERIALS.—Goods and materials. Form, etc., from Mr. Walter R. Locke, Waterworks Engineer and Manager, Town Hall, Hemel Hempsted.

JUNE 23.—**London.**—METALS.—The Board of Directors of the Madras and Southern Mahratta Railway Company, Ltd., invite tenders for metals, as per the specification which may be seen at the offices of the company. The charge for each specification is 1*l.* 1*s.*, which will not be returned. Mr. Edw. Z. Thornton, secretary. Offices, 46, Queen Anne's-gate, S.W.

JUNE 23.—**Merthyr Tydfil.**—ROAD MACADAM.—Merthyr Tydfil Corporation invite tenders for the supply of macadam. Specification, etc., may be obtained upon application to the Borough Engineer, Town Hall, Merthyr Tydfil.

JUNE 25.—**Enfield.**—GRANITE.—The U.D.C. of Enfield invite tenders for the supply of 1,500 tons (more or less) of hand-broken Clee Hill, Dhu, or best blue Guernsey granite, and 1,300 tons (more or less) of broken Leicestershire or other approved granite. Forms to be obtained only of Mr. Richard Collins, the Council's Surveyor, Public Offices, Enfield, Middlesex.

JUNE 25.—**Romford.**—GRANITE.—The Romford U.D.C. invite tenders for the supply of 500 tons of best blue Guernsey granite, broken to 1½-in. cube. Forms of tender can be obtained on application to either Mr. J. Turvey, the Surveyor, or Mr. Charles T. King, Clerk, at the Council Offices, Romford.

* JUNE 25.—**Brighton.**—DRAIN PIPES.—The Brighton B.C. invite tenders for supply of glazed drain pipes for one year. See advertisement in this issue for further particulars.

JUNE 26.—**Brighton.**—GRANITE.—The B.C. invite tenders for the supply of 600 tons of 2-in. broken granite for roadmaking. The specification, etc., may be obtained on application at the office of the Borough Surveyor, at the Town Hall, Brighton.

JUNE 26.—**Cork.**—STONE.—The Council of the County Borough of Cork invite tenders for supplying stones in bulk, and, also, stones broken. Specification, etc., to be seen in the City Engineer's Office, City Hall, where tender forms will be issued.

JUNE 26.—**North Walsham.**—GRANITE.—North Walsham U.D.C. invite tenders for 400 tons of granite and 30 tons of granite chips. Mr. E. J. Simpson, North Walsham, Surveyor to the Council.

JUNE 27.—**Ealing.**—OILS, ETC.—The T.C. of the Borough of Ealing invite tenders for the supply to their electricity works of best cylinder oil, crank-chamber oil, paraffin, engine oil, best rope waste, and stoneware pipes. Tender forms, etc., can be obtained on application to Mr. J. Douglas Knight, M.I.E.E., M.I.Mech.E., Borough Electrical Engineer and Manager, Electricity Department, Town Hall, Ealing, W.

JUNE 29.—**Sunbury-on-Thames.**—GRANITE, ETC.—The U.D.C. invite tenders for the supply for the coming season of 450 tons of granite; also for the supply and delivery of 800 cubic yds. of Kentish brown pit flints. Further particulars may be obtained of Mr. Harold F. Coales, the Surveyor to the Council.

JUNE 29.—**Witham.**—GRANITE.—Witham U.D.C. invite tenders for granite, 600 tons for main roads and 400 tons for other roads, uniformly broken to 1½-in. gauge. Mr. Wm. Bindon Blood, Clerk of the Council.

JULY 4.—**Harrow.**—GRANITE, ETC.—Harrow-on-the-Hill U.D.C. invite tenders for the supply of about 2,000 tons of 2-in. and 1¼-in. broken granite, and 1 in. or ¾-in. granite chippings; also about 120 yds. of coarse gravel and 150 yds. of fine gravel. Mr. J. Percy Bennetts, Surveyor to the Council, Harrow.

JULY 4.—**Loughton.**—GRANITE, ETC.—Loughton U.D.C. invite tenders for the supply of granite, 500 tons, broken to pass 1¾-in. ring; also for scarifying and steam rolling above granite when laid. The District Surveyor to the Council will supply all information required.

NO DATE.—**Auckland.**—CAPSTANS, ETC.—Auckland Harbour Board invite tenders for:—(1) Fourteen 1-ton electric capstans; (2) twin-screw combined ladder and suction dredger; (3) stationary suction dredger; (4) second-hand modern self-propelling ladder and suction dredger plant. Full particulars may be obtained from the Board's London agents, McArthur Engineering Company, Ltd., 18-19, Silk-street, Cripplegate, E.C. Specifications may be had in return for a deposit of 1*l.* 1*s.*

Public Appointments.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
•VISITING TEACHERS IN TECHNICAL INSTITUTES	London County Council	See advertisement in this issue	June 15
•ASSISTANT SURVEYOR	Macclesfield Borough Council	120*l.* per annum	June 18
•ASSISTANT INSTRUCTOR (BUILDING TRADE DEPT.)	Leicester Munici. Tech. Schl.	130*l.* per annum	June 22
•SUPERINTENDT. OF HOUSE CONNEXS. (WTR. AND SEW.)	Rangoon Municipality	See advertisement in this issue	July 15

Auction Sales.

Nature and Place of Sale.	By whom Offered.	Date of Sale
•FREEHOLD BUILDING ESTATE, SEVENOAKS—At the Mart	Cronks	June 15
•FREEHOLD BUILDING ESTATE, ENFIELD—At the Mart	Walton & Lee	June 16
•BLDRS.' IRONMGRY., LEAD, ETC., MERCHANT'S STK., BROMLEY, KENT—On Premises	H. W. Smith	do.
•DEALS, BATTENS, ETC.—Great Hall, Winchester House, Old Broad-street, E.C.	Churchill & Sims	June 17
•LEAD, GLASS, OIL, COLOUR, ETC., MERCHANT'S STK., MARYLEBONE, W.—On Premises	H. W. Smith	June 19
•BUILDING LAND, GREENFORD, MIDDLESEX—At the Mart	May & Rowden	June 22
•BUILDER'S PLANT AND MACHINERY, ISLEWORTH—On the Premises	Fuller, Horsey, Sons, & Cassell	June 24
•FREEHOLD PROPERTY, SOHO—At the Mart	Douglas Young & Co.	do.
•BUILDER'S PLANT AND STOCK, CHELSEA—On the Premises	Fuller, Horsey, Sons, & Cassell	June 25
•FREEHOLD ESTATE, TULSE HILL—At the Mart	Stanley Parkes & Brown	June 26
•FREEHOLD BUILDING PLOTS, MILL HILL, N.W.—On the Estate	C. Rawley Cross & Co	June 30
•FREEHOLD BUILDING ESTATE, BRENTWOOD—At the Mart	Browett & Taylor	July 1
•FREEHOLD BUILDING PLOTS, HIGH BARNET—Red Lion Hotel, Barnet	Charles Sparrow & Son	July 6
•FREEHOLD ESTATE, ETC., CROYDON—At the Mart	Farebrother, Ellis, & Co.	July 23
•FREEHOLD BUILDING LAND, HARROW WEALD—At the Mart	Farebrother, Ellis, & Co.	July —

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

May 23.—By R. L. ASHTON (at Oakhampton).
Black Torrington, Devon.—The Bridge Estate, 264 acres, f. £3,062

MAY 27.—By HENRY J. WAY & SON (at Niton).
Niton, Hants.—1 and 2, High-st. (s.), f., w. and e.r. 35*l.* 580

MAY 28.—By NICHOLAS, DENYER, & CO. (at Reading).
Reading, Berks.—84, King's-rd., Clifton Lodge, and 41 and 43, Queen's-rd., f. 6,500

By EDWIN HASLAM (at Bolton).
Bolton, Lancs.—Derby-st., etc., f.g. rents, 518*l.* 11*s.* 6*d.*, with reversion (in 19 lots) .. 12,553

MAY 29.—By GEORGE LOVEITT & SONS (at Coventry).
Ullesley, Warwick.—Oak Lodge, 9 a. 3 r. 27 p., f. 2,024

By H. J. AUSTEN & SONS (at Tunbridge Wells).
Ticehurst, Sussex.—New House Farm, 51 acres, f. 1,350

MAY 30.—By WOODS & CO. (at Northampton).
Kislingbury, Northamptonshire. — Freehold estate, farms, and accommodation land, 124½ acres 5,270
Northampton.—62 to 69 (even), Talbot-rd., and 13, St. George's-pl., *l.*, y.r. 25*l.* 2,635

By STAFFORD & ROGERS (at Bedford).
Clifton, etc., Beds.—Freehold estate, farmhouses and homesteads, 264½ acres 8,155

JUNE 1.—By GEO. GOULDSMITH, SON, & CO.
South Kensington.—29, Redcliffe-sq., u.t. 56 yrs., g.r. 1*l.*, y.r. 51*l.* 980

By G. B. HILLIARD & SON.
Thorpe-le-Soken, Essex.—Landermere Hall and New Hall Farms, wharf and warehouses, nine cottages, 540 acres, f. 7,550
King's Head Inn, p.h., 1 a. 0 r. 14 p., f. 460
Accommodation land, cottages, etc., 8 a. 2 r. 30 p., f. 403
Thorpe Cross, Essex.—Thorpe-pk., land, two cottages, 17 a. 3 r. 13 p., f. 520

By JONES, SON, & DAY.
Walthamstow.—South-gr., f.g. rents 20*l.*, reversion in 80 yrs. 455
Wimbledon.—Brookwood-rd., f.g.r. 7*l.*, reversion in 92 yrs. 155
Bermondsey.—107, Southwark Park-rd., f., y.r. 32*l.* 385
Canning Town.—10, Beckton-rd. (s.), f., y.r. 21*l.* 10*s.* 250
1, Peter-st. (s.), f., w.r. 28*l.* 12*s.* 200
East Ham.—Barking-rd., freehold building land 350
Poplar.—449, East India Dock-rd., u.t. 65 yrs., g.r. 8*l.* 8*s.*, w.r. 44*l.* 4*s.* 200
North Woolwich.—208, Albert-rd. (s.), f., w.r. 40*l.* 6*s.* 250
Ilford.—51, Ley-st. (s.), f., y.r. 36*l.* 380
Walthamstow.—11, Hale End-rd. (s.), f., y.r. 26*l.* 270

By KEMSLEYS'.
Woodham Ferris, Essex. — Three freehold cottages, y.r. 16*l.* 10*s.* 220

By KING & CHASEMORE.
Rudgwick, Sussex.—Cousins, 3 a. 1 r. 15 p., f., y.r. 20*l.* 600
Hawkshills, 18 a. 1 r. 34 p., f., y.r. 20*l.* 900

By W. BROWN & CO. (at Tring).
Marshworth, Bucks.—The Manor Farm, 91 acres, f. £5,875

JUNE 2.—By CHINNOCK, CLARKE, & CHINNOCK.
Lancaster Gate.—Queen's-gdns., f.g.r. 30*l.*, reversion in 45 yrs. 950

By FAREBROTHER, ELLIS, & CO.
Covent Garden.—7 to 12, Bow-st., and 52, Floral-st. (s.), f., y.r. 575*l.*, area 4,400 ft. 19,000
Tottenham Court-rd.—No. 28 (s.), c., y.r. 60*l.* 1,200
Peckham.—18, 18A, and 18B, Rye-la. (s.), f., y.r. 230*l.*, area 6,200 ft. 4,725

By EDWIN FOX & BOUSFIELD.
Bermondsey.—34 to 44 (even), Bermondsey-st., u.t. 49 yrs., g.r. 305*l.*, y. and e. rents 585*l.*, area 13,250 ft. 1,500

By GREEN & SON.
Hammersmith.—Albert-ter., f. and c.g. rents, 48*l.* 5*s.*, reversion in 55½ yrs. ..... 5, 6, 7, and 8, Chapel-st., u.t. 5½ yrs., g.r. 10*l.* 10*s.*, w.r. 117*l.* 185

By HUNTER & HUNTER.
Maida Vale.—No. 126, f., y.r. 80*l.*, subject to an annual rent of 16*l.* 2*s.* 6*d.* 640

By LINNETT & LANE.
Bushey, Herts. — Aldenham-rd., freehold building land 439

By J. A. & W. THARP.
Balham.—33, 35, 37, and 39, Ravenswood-rd., f., w.r. 156*l.* 1,460
Vauxhall.—3, Rochampton-st., u.t. 18 yrs., g.r. 10*l.*, y.r. 45*l.* 245

By GEORGE LOVEITT & SONS (at Coventry).
Coventry, Warwick.—12, Broadgate (s.), f., y.r. 130*l.* 4,400
Mount-st., Craven-st., etc., 33 freehold houses, w.r. 402*l.* 4,755

By GRIMLEY & SON (at Birmingham).
King's Heath, Worcester.—Alcester-rd., Heerongate, u.t. 57 yrs., g.r. 6*l.* 5*s.*, y.r. 50*l.* 575
Taylor-rd., The Henburys, f., y.r. 50*l.* 840
Taylor-rd., building land, Rose and Laburnham Cottages, f., y.r. 85*l.* 2,655
Aston, Warwick.—439 to 463 (odd), Lichfield-rd., f., y. and w.r. 197*l.* 16*s.* 2,200
Moseley, Worcester. — Stoney-la., freehold building estate, 2½ acres. 1,650
Smethwick, Staffs.—Bampton-rd., f.g.r. 26*l.*, reversion in 78 yrs. 640

By DRIVER, JONAS, & CO. (at Abergavenny).
Llangenny, etc., Brecon.—Freehold allotments, 47 acres. 521
Llanelly, Brecon.—Pen-y-Wern Farm, 89½ acres, f. 1,500
Pant Draenog and accommodation land, etc., 28 a. 3 r. 6 p., f. 457
Llangenny, Brecon.—Panteg Farm and Plantation, 71 a. 2 r. 3 p., f. 1,841

By STEPHENSON & ALEXANDER (at Cardiff).
Peterstone-Super-Ely, Glam. — Ffynonwen Farm, 36 a. 3 r. 29 p., f. 2,100
Freehold pasture field, 1½ acres. 100

JUNE 3.—By JOHN H. BETHELL.
Wanstead.—Park-rd., freehold building land, 1 a. 3 r. 17 p. 2,000
Blake Hall-rd., freehold building land, 12½ acres. 5,700
Stratford.—58, Vicarage-rd., f., w.r. 36*l.* 8*s.* .. 280

By HENRY HOLMES & CO.
Marylebone.—13 and 14, Foley-st., and 3, Ogle-mews, u.t. 18½ yrs., g.r. 31*l.*, w.r. 409*l.* 10*s.* 1,115

By J. WALTER NEIGHBOUR.
St. Lukes.—9, Ludlow-st., and plot of ground, f., w.r. 21*l.* 6*s.* £175

By WALLER & KING (at Southampton).
Southampton, Hants.—Commercial-road, Hillside, Woodside; 9, Spring-pl.; 115, Hill-la., f., y.r. 103*l.* 1,510
The Polygon, Handel College, 1 acre, y.r. 50*l.* 1,000
Commercial-road, building site, etc., area 22,080 ft., f. 3,025
Woolston, Hants.—Portsmouth-rd., Westcliffe, Eastcliffe, and Overcliffe, f., y.r. 142*l.* 10*s.* 1,710
Southampton, Hants.—25, Melbourne-st. (s.), u.t. 39 yrs., g.r. 5*l.* 7*s.* 6*d.*, y.r. 22*l.* 250

By STEPHENSON & ALEXANDER (at Newport).
Newport, Mon.—The Gaer estate, 112¼ acres, f., y.r. 530*l.* 20,000

JUNE 4.—By EDWIN W. HARRIS.
Sydenham.—1 to 17, Edney-st., u.t. 41 yrs., g.r. 59*l.* 16*s.*, w.r. 287*l.* 6*s.* 700

By MOSS & JAMESON.
Hampstead.—218, Adelaide-rd., u.t. 34 yrs., g.r. nil, e.r. 80*l.* 470

By NEWBON, SHEPHARD, & EDWARDS.
Shadwell.—6 to 13, Mercer-st., u.t. 5 yrs., g.r. 24*l.*, w.r. 93*l.* 12*s.* 125
Islington.—1 and 2, Wilton-sq., u.t. 17½ yrs., g.r. 8*l.* 8*s.*, w.r. 85*l.* 16*s.* 225
Hoxton.—32, Penn-st., u.t. 28 yrs., g.r. 5*l.* 10*s.*, y.r. 34*l.* 155
Bethnal Green.—8, 9, and 10, Durrant-st., u.t. 14 yrs., g.r. 12*l.* 12*s.*, w.r. 105*l.* 6*s.* 270
Chelsea.—7, Milner-st., u.t. 35½ yrs., g.r. 8*l.*, y.r. 50*l.* 365
Holloway.—29, Dresden-rd., u.t. 87 yrs., g.r. 7*l.* 7*s.*, y.r. 34*l.* 280

By STIMSON & SON.
Camberwell.—Herring-st., f.g.r. 20*l.*, reversion in 13 yrs. 1,250
Neate-st., f.g.r. 12*l.*, reversion in 11 yrs. 1,300
145, Neate-st., The Prince of Wales p.h., f., y.r. 40*l.* 950
199, Albany-rd., u.t. 48½ yrs., g.r. 7*l.* 10*s.*, w.r. 41*l.* 12*s.* 240
2, 4, and 6, Cunard-st., u.t. 70½ yrs., g.r. 22*l.* 10*s.*, w.r. 91*l.* 570
1 to 33 (odd), Cunard-st., u.t. 70½ yrs., g.r. 130*l.*, w.r. 568*l.* 18*s.* 3,200
100 to 126 (even), Coburg-rd., u.t. 49½ yrs., g.r. 100*l.*, w.r. 598*l.* 3,350
39 to 49 (odd), 54 to 76, Loncroft-rd., u.t. 49½ yrs., g.r. 135*l.*, w.r. 637*l.* 3,700
Kingston-on-Thames.—Fife-rd., f.g.r. 20*l.*, reversion in 81 yrs. 500

By WORSFOLD & HAYWARD (at Dover).
Dover, Kent.—3, 22, 23, 24, and 25, Bartholomew-st., f., y. and w.r. 95*l.* 12*s.* 1,100
2 and 3, Bridge-st., u.t. 54 yrs., g.r. 4*l.*, w.r. 37*l.* 14*s.* 300
16, East-st.; 33 and 34, Tower-st.; 55, 56, and 57, Tower Hamlets-st., f., w.r. 87*l.* 18*s.* 850

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beerhouse; p.h. for public-house; o. for office; s. for shops; ct. for court.

TERMS OF SUBSCRIPTION.

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MEETINGS.

SATURDAY, JUNE 13.

Northern Architectural Association.—Visit to South Shields.

WEDNESDAY, JUNE 17.

Institute of Sanitary Engineers. — Visit to Royal Primrose Soap Works, Silvertown, E.

SATURDAY, JUNE 20.

Architectural Association.—Second summer visit to Rochester.

Edinburgh Architectural Association.—Visit to Jedburgh Abbey.

Royal Sanitary Institute (Coventry Meeting). — Discussion on "Some Aspects of the Housing Problem and Town Planning," to be opened by Mr. E. H. Snell, M.D., B.Sc., D.P.H., Medical Officer of Health, and Mr. J. E. Swindlehurst, M.Inst.C.E., City Engineer. Visits will be made to places of interest in the City and to Kenilworth Castle.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£	s.	d.		
Best Stocks	1	8	0	per 1000	alongside, in river.
Picked Stocks for Facings	2	10	0	"	delivered.
Flettons	1	7	0	"	at railway depôt.
Best Fareham Red	3	12	0	"	" "
Best Red Pressed Ruabon Facing	5	0	0	"	" "
Best Blue Pressed Staffordshire	3	15	0	"	" "
Do. Bullnose	4	0	0	"	" "
Best Stourbridge Fire Bricks	3	14	0	"	" "
GLAZED BRICKS.					
Best White and Ivory Glazed Stretchers	10	7	6	"	" "
Headers	9	17	6	"	" "
Quoins, Bullnose, and Flats	13	17	6	"	" "
Double Stretchers	15	17	6	"	" "
Double Headers	12	17	6	"	" "
One Side and two Ends	16	17	6	"	" "
Two Sides and one End	17	17	6	"	" "
Splays, Chamferred, Squints	15	10	0	"	" "
Best Dipped Salt Glazed Stretchers	10	7	6	"	" "
Headers	9	17	6	"	" "
Quoins, Bullnose, and Flats	13	17	6	"	" "
Double Stretchers	15	17	6	"	" "
Double Headers	12	17	6	"	" "
One Side and two Ends	16	17	6	"	" "
Two Sides and one End	17	17	6	"	" "
Splays, Chamferred, Squints	15	10	0	"	" "
Second Quality White and Dipped Salt Glazed	1	5	0	"	less than best.

	s.	d.	
Thames and Pit Sand	6	6	per yard, delivered.
Thames Ballast	5	0	" "
Best Portland Cement	28	0	per ton, "
Best Ground Blue Lias Lime	19	0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s. 6d. per yard, delivered.
Stourbridge Fireclay in sacks 27s. 0d. per ton at rly. dpt.

STONE.

	s.	d.	
BATH STONE—delivered on road waggons, Paddington Depôt	1	6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1	8½	" "
PORTLAND STONE (20 ft. average)—			
Brown Whitbed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2	1	" "
White Basebed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2	2½	" "
	s.	d.	
Ancaster in blocks	1	10	per ft. cube, deld. rly. depôt.
Beer "	1	6	" "
Greenshill "	1	10	" "
Darley Dale in blocks	2	4	" "
Red Corsehill "	2	2	" "
Closeburn Red Freestone	2	0	" "
Red Mansfield "	2	4	" "
YORK STONE—*Robin Hood Quality.*	s.	d.	
Scappled random blocks, 6 in. sawn two sides landings to sizes (under 40 ft. super.)	2	10	" "
6 in. rubbed two sides ditto, ditto	2	3	per ft. super. "
	2	6	" "

STONE (*continued*).

	s.	d.	
YORK STONE—(*Robin Hood Quality*) *continued*—			
3 in. sawn two sides slabs (random sizes)	0	11½	per ft. cube deld. rly. dep
2 in. to 2½ in. sawn one side slabs (random sizes)	0	7½	" "
1½ in. to 2 in. ditto, ditto	0	6	" "
HARD YORK—			
Scappled random blocks	3	0	" "
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2	8	per ft. super. "
6 in. rubbed two sides ditto	3	0	" "
3 in. sawn two sides slabs (random sizes)	1	2	" "
2 in. self-faced random flags	0	5	" "

SLATES.

In.	In.	£	s.	d.	
20×10 best blue Bangor		13	2	6	per 1000 of 1200 at r.d.
20×12	" "	18	17	6	" "
20×10 first quality	"	13	0	0	" "
20×12	" "	13	15		" "
16×8	" "	7	5	0	" "
20×10 best blue Portmadoc		12	12	6	" "
16×8	" "	6	12	6	" "
20×10 best Eureka unfading green		15	17	6	" "
20×12	" "	18	7	6	" "
18×10	" "	13	5	0	" "
16×8	" "	10	5	0	" "
20×10 permanent green		11	12	6	" "
18×10	" "	9	12	6	" "
16×8	" "	6	12	6	" "

TILES.

	s.	d.	
Best plain red roofing tiles	42	0	per 1000 at rly. depôt.
Hip and Valley tiles	3	7	per doz. "
Best Broseley tiles	50	0	per 1000 "
Do. Ornamental tiles	52	6	" "
Hip and Valley tiles	4	0	per doz. "
Best Ruabon red, brown, or brindled do. (Edwards)	57	6	per 1000 "
Do. Ornamental do.	60	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	0	" "
Best Red or Mottled Staffordshire do. (Peakes)	51	9	per 1000 "
Do. Ornamental do.	54	6	" "
Hip tiles	4	1	per doz. "
Valley tiles	3	8	" "
Best "Rosemary" brand plain tiles	48	0	per 1000 "
Best Ornamental tiles	50	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	8	" "
Best "Hartshill" brand plain tiles, sand-faced	50	0	per 1000 "
Do. pressed	47	6	" "
Do. Ornamental do.	50	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	6	" "
Staffordshire (Hanley) Reds or Brindled tiles	42	6	per 1000 "
Hand-made sand-faced	45	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	6	" "

WOOD.

BUILDING WOOD.	At per standard. £	s.	d.		£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	13	10	0	...	15	0	0
Deals: best 3 by 9	13	0	0	...	14	0	0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11	0	0	...	12	0	0
Battens: best 2½ by 6 and 3 by 6	0	10	0		less than 7 in. and 8 in.		
Deals: seconds	1	0	0		less than best.		
Battens: seconds	0	10	0		" "		
2 in. by 4 in. and 2 in. by 6 in.	9	0	0	...	10	0	0
2 in. by 4½ in. and 2 in. by 5 in.	8	10	0	...	9	10	0
Foreign Sawn Boards— in. and 1½ in. by 7 in.	0	10	0		more than battens.		
¾ in.	1	0	0		"		
Fir timber: best middling Danzig or Memel (average specification)	At per load of 50 ft. 4	10	0	...	5	0	0
Seconds	4	0	0	...	4	10	0
Small timber (8 in. to 10 in.)	3	12	6	...	3	15	0
Small timber (6 in. to 8 in.)	3	0	0	...	3	10	0
Swedish balks	2	10	0	...	3	0	0
Pitch-pine timber (30 ft. average)	4	0	0	...	4	15	0
JOINERS' WOOD.	At per standard.						
White Sea: first yellow deals, 3 in. by 11 in.	24	0	0	...	25	0	0
3 in. by 9 in.	22	0	0	...	23	0	0
Battens, 2½ in. and 3 in. by 7 in.	16	10	0	...	18	0	0
Second yellow deals, 3 in. by 11 in.	18	10	0	...	20	0	0
" " 3 in. by 9 in.	17	10	0	...	19	0	0
Battens, 2½ in. and 3 in. by 7 in.	13	10	0	...	14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	13	10	0	...	15	0	0
Battens, 2½ in. and 3 in. by 7 in.	11	0	0	...	12	0	0
Petersburg first yellow deals, 3 in. by 11 in.	21	0	0	...	22	10	0
Do. 3 in. by 9 in.	18	0	0	...	19	10	0
Battens	13	10	0	...	15	0	0
Second yellow deals, 3 in. by 11 in.	16	0	0	...	17	0	0
Do. 3 in. by 9 in.	14	10	0	...	16	0	0
Battens	11	0	0	...	12	10	0
Third yellow deals, 3 in. by 11 in.	13	0	0	...	14	0	0
Do. 3 in. by 9 in.	12	10	0	...	14	0	0
Battens	10	0	0	...	11	0	0
White Sea and Petersburg— First white deals, 3 in. by 11 in.	14	10	0	...	15	10	0
" " 3 in. by 9 in.	13	10	0	...	14	10	0
Battens	11	0	0	...	12	0	0
Second white deals, 3 in. by 11 in.	13	10	0	...	14	10	0
" " 3 in. by 9 in.	12	10	0	...	13	10	0
Battens	10	0	0	...	11	0	0
Pitch-pine: deals	18	0	0	...	21	0	0
Under 2 in. thick extra	0	10	0	...	1	0	0
Yellow pine—First, regular sizes	44	0	0		upwards.		
Oddments	32	0	0		"		
Seconds, regular sizes	33	0	0		"		
Oddments	22	0	0		"		
Kauri Pine—Planks, per ft. cube	0	3	6	...	0	5	0

WOOD (*continued*).

JOINERS' WOOD (*continued*)—	At per standard. £	s.	d.		£	s.	d.
Dantzig and Stettin Oak Logs— Large, per ft. cube	0	3	0	...	0	3	6
Small " "	0	2	6	...	0	2	9
Wainscot Oak Logs, per ft. cube	0	5	6	...	0	6	0
Dry Wainscot Oak, per ft. sup. as inch	0	0	8½	...	0	0	9½
¾ in. do. do.	0	0	7	...		—	
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch	0	0	9	...	0	1	0
Selected, Figury, per ft. super. as inch	0	1	6	...	0	2	6
Dry Walnut, American, per ft. super. as inch	0	0	10	...	0	1	0
Teak, per load	17	0	0	...	22	0	0
American Whitewood Planks, per ft. cube	0	4	0	...	0	5	0
Prepared Flooring, etc.—	Per square.						
1 in. by 7 in. yellow, planed and shot	0	13	6	...	0	17	0
1 in. by 7 in. yellow, planed and matched	0	14	0	...	0	18	0
1¼ in. by 7 in. yellow, planed and matched	0	16	0	...	1	0	0
1 in. by 7 in. white, planed and shot	0	12	0	...	0	14	6
1 in. by 7 in. white, planed and matched	0	12	6	...	0	15	0
1¼ in. by 7 in. white, planed and matched	0	15	0	...	0	16	6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0	11	0	...	0	13	6
1 in. by 7 in. " "	0	14	0	...	0	18	0
¾ in. by 7 in. white "	0	10	0	...	0	11	6
1 in. by 7 in. " "	0	12	9	...	0	15	6

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £	s.	d.		£	s.	d.
Rolled Steel Joists, ordinary sections	7	0	0	...	7	10	0
Compound Girders, ordinary sections	9	0	0	...	10	0	0
Steel Compound Stanchions	11	0	0	...	12	0	0
Angles, Tees, and Channels, ordinary sections	9	0	0	...	10	0	0
Flitch Plates	9	0	0	...	9	10	0
Cast Iron Columns and Stanchions including ordinary patterns	7	10	0	...	8	10	0

METALS.

	Per ton, in London. £	s.	d.		£	s.	d.
IRON—							
Common Bars	8	10	0	...	9	0	0
Staffordshire Crown Bars, good merchant quality	8	15	0	...	9	5	0
Staffordshire "Marked Bars"	10	10	0	...	—		
Mild Steel Bars	8	15	0	...	9	5	0
Hoop Iron, basis price	9	5	0	...	9	10	0
" " Galvanised	17	0	0	...	—		

(*And upwards, according to size and gauge.)

Sheet Iron Black—							
Ordinary sizes to 20 g.	9	15	0	...	—		
" " 24 g.	10	15	0	...	—		
" " 26 g.	12	5	0	...	—		
Sheet Iron, Galvanised, flat, ordinary quality—							
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	15	0	0	...	—		
Ordinary sizes to 22 g. and 24 g.	15	10	0	...	—		
" " 26 g.	16	10	0	...	—		
Sheet Iron, Galvanised, flat, best quality—							
Ordinary sizes to 20 g.	18	0	0	...	—		
" " 22 g. and 24 g.	18	10	0	...	—		
" " 26 g.	21	0	0	...	—		
Galvanised Corrugated Sheets—							
Ordinary sizes, 6 ft. to 8 ft. 20 g.	14	10	0	...	—		
" " 22 g. and 24 g.	14	15	0	...	—		
" " 26 g.	16	5	0	...	—		
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	12	0	0	...	—		
Best Soft Steel Sheets, 22 g. & 24 g.	13	0	0	...	—		
" " " 26 g.	15	0	0	...	—		
Cut Nails, 3 in. to 6 in.	10	10	0	...	11	0	0

(Under 3 in., usual trade extras.)

LEAD, &c.	Per ton, in London. £	s.	d.		£	s.	d.
LEAD—Sheet, English, 3lb. and up.	16	0	0	...	—		
Pipe in coils	16	10	0	...	—		
Soil pipe	19	0	0	...	—		
Compo pipe	20	0	0	...	—		
ZINC—sheet—							
Vieille Montagne ton	27	5	0	...	—		
Silesian	27	0	0	...	—		
COPPER—							
Strong Sheet per lb.	0	1	0	...	—		
Thin " "	0	1	1	...	—		
Copper nails "	0	0	10	...	—		
Copper wire "	0	0	10	...	—		
BRASS—							
Strong Sheet "	0	0	11	...	—		
Thin "	0	1	0	...	—		
Tubes "	0	1	4½	...	—		
TIN—English Ingots "	0	0	7	...	—		
SOLDER—Plumbers' "	0	0	9½	...	—		
Tinmen's "	0	0	11½	...	—		
Blowpipe "							

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES

15 oz. thirds	2½d. per ft. delivered.
" fourths	1¾d. " "
21 oz. thirds	3d. " "
" fourths	2¼d. " "
26 oz. thirds	4d. " "
" fourths	3¼d. " "
32 oz. thirds	4¾d. " "
" fourths	4¼d. " "
Fluted Sheet, 15 oz.	3¼d. " "
" 21 oz.	4¼d. " "

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

⅛ Hartley's	2¼d. per ft. delivered.
¼ "	2¾d. " "
⅜ "	3¾d. " "
Figured, Oxford Rolled, and "Oceanic" Glass, white	3¾d. " "
" tinted	5¼d. " "
OTHER GLASS—	
"Arctic" Glass, white	4d. " "
" tinted	5¼d. " "
" ruby and opalescents	1s. " "

OILS, &c.		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 2 0
" " " in barrels	"	0 2 1
" " " in drums	"	0 2 3
Boiled " in pipes	"	0 2 2
" " " in barrels	"	0 2 3
" " " in drums	"	0 2 5
Turpentine in barrels	"	0 2 8
" in drums	"	0 2 11
Genuine Ground English White Lea	per ton	21 10 0
Red Lead, Dry	"	20 10 0
Best Linseed Oil Putty	per cwt.	0 7 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 6
Fine Elastic Carriage	0 12 0
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 0
Berlin Black	0 16 0
Knotting	0 10 9
French and Brush Polish	0 10 6

TO CORRESPONDENTS.

NOTE.—**The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.**

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples, sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance. The Editor cannot undertake to read and consider articles offered for acceptance unless they are type-written.

All communications regarding literary and artistic matters should be addressed to THE EDITOR: those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursday*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building owner; and we cannot publish announcement of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ABERDEEN.—For erecting a hide and tallow market, Hutcheon-street and Fraser-road, for Aberdeen Hide, Skin, and Tallow Market Company, Ltd., Mr. J. Rust, architect, 224, Union-street, Aberdeen:—

Mason Work.

C. Gordon	£2,593 0 0	J. Morgan	£2,450 0 0
E. Gauld	2,566 0 0	Bowie & Manson	2,447 6 0
R. & S. Pringle	2,555 17 6	Findlay & Henderson	2,432 6 6
J. King	2,555 0 0	J. Gauld	2,425 0 0
L. Smith	2,525 0 0	D. Weir	2,397 10 0
A. Anderson	2,515 0 0	G. Hall	2,395 0 0
Gall & Walker	2,505 0 0	G. Duguid & Son	2,379 0 0
A. Milne & Sons	2,496 0 0	R. T. Smith	2,351 0 0
R. Beattie & Son	2,493 0 0	G. Ogg & Son*	2,256 0 0
W. Farquharson	2,482 0 0		
P. Bisset & Son	2,480 14 3		

Carpenter Work.

A. Mercer	£1,595 0 0	D. McAndrew	£1,468 0 0
J. Henderson	1,585 10 0	J. Walker	1,460 0 0
King & Milne	1,530 0 0	Burnett & Low	1,452 19 5
W. & J. Smart	1,529 0 0	Stalker & Craigen	1,419 0 0
Clark & Donaldson	1,525 0 0	J. Robb	1,398 0 0
W. Dawson	1,525 0 0	G. Lyall	1,395 0 0
W. D. Forbes	1,522 0 0	R. Reid	1,375 0 0
A. Innes & Sons	1,520 0 0	Henry & Keith	1,370 0 0
J. Kirton	1,520 0 0	G. Jamieson	1,370 0 0
A. Hall	1,499 0 0	Leslie & Hay*	1,329 0 0
J. Wishart	1,498 0 0		

Plumber Work.

A. G. Emslie	£583 10 0	A. Lamb & Son	£518 6 0
A. Mitchell	569 0 0	J. Blaikie & Sons	524 0 0
J. Matthews & Sons	560 0 0	James Worling	515 18 0
J. F. Anderson	558 0 0	Thom & Strachan	513 10 0
J. Summers	550 0 0	D. Ogilvie	509 3 0
J. Cowie	548 10 0	John Worling	506 19 9
R. Fotheringham	527 0 0	A. S. Smith	502 5 0
J. Munro	524 12 6	W. Simpson	498 18 5
A. B. Robertson	521 0 0	J. T. Ross*	489 0 0
J. Dean	518 8 0	J. Adam‡	449 0 0

‡ Withdrawn.

Plaster Work.

A. Hendry & Sons	£1,014 10 0	R. Moir	£767 0 0
G. Gibb & Son	831 2 4	J. Bannochie	754 5 9
J. Stephen	826 16 0	Sellar & Co.	717 8 6
A. Stephen	813 14 6	J. Scott & Son*	699 15 0

Slater Work.

A. Calder	£445 0 0	A. Harper & Sons	£398 0 0
G. Davidson	445 0 0	J. McDonald	396 17 6
R. Stuart	422 15 0	C. Maitland & Son	387 0 0
W. Anderson	418 10 0	G. Currie & Co.	385 0 0
A. Murray & Sons	417 8 8	G. Farquhar	384 0 0
A. Martin	411 3 9	A. Adam & Co.	367 18 0
G. Bain	409 0 0	J. Wright	363 10 0
J. Milne	409 0 0	F. Morrison	353 17 6
J. Durnin	406 11 0	Merson & Stewart*	348 13 0
A. Milne & Sons	405 0 0		
A. Law	398 10 0		

Painter Work.

J. Williamson	£244 17 0	E. Copland	£225 0 0
M. Watt & Co.	243 15 0	G. Donald & Sons	221 0 0
J. & S. Fyfe	242 3 0	A. Aitken & Son	220 0 0
McDonald & Duffus	241 0 0	G. Lamb & Son	218 17 6
W. Philip	239 10 0	Gordon & Watt	218 10 0
A. Ferguson & Co.	238 0 0	J. McLaren	218 0 0
J. Mason & Son	234 13 6	J. Whyte	217 0 0
J. Garvie & Sons	229 0 0	Murray & Mitchell	209 19 0
A. Buchan	225 0 0	B. Main*	201 19 5

Iron Work.

J. Abernethy & Co.	£205 0 0	G. Bisset	£190 7 0
J. A. Sangster	193 6 0	G. Thomson*	166 10 0

Electric Lighting.

A. B. Robertson	£153 0 0	C. Hamilton	£133 0 0
J. Jackson	145 5 6	J. F. Anderson	131 12 0
Aberdeen Electrical Engineering Co.	142 18 0	Pratt & Keith	122 17 0
		J. Blaikie & Sons*	107 0 0

[All of Aberdeen.]

ALNWICK.—For paving in Howick-street and Claryport Main-street, for the Urban District Council. Mr. Geoffrey Wilson, Town Surveyor, Alnwick. Quantities by Surveyor:—

	Per super. yd. s. d.	£ s. d.
C. Thompson & Sons	3 9	187 10 0
J. Whinham	3 6	175 0 0
Wight Bros., Alnwick*	3 0	150 0 0

[About 1,000 super. yds. Old flagging to be used up as bottoming.]

BOURNEMOUTH. — For making-up Avon-road (last portion), Shaftesbury-road (second portion), Oak-road, Myrtle-road, etc., for the Borough Council. Mr. F. W. Lacey, Borough Engineer and Surveyor, Municipal Offices, Bournemouth:—

W. P. Saunders, Bournemouth* £651 6 1

BRACKLEY.—For pump and staging in a well, for the Borough Council. Mr. J. Eunson, C.E., Northampton:—

Contract No. 2—Pumps, etc.

E. Timmins & Son, Runcorn* £587

Contract No. 3—Engine-house, etc.

E. Archer, Northampton* £455

BRIGHTON.—For the supply of dressed granite, kerb, and channel, for the Borough Council:—

—	Description of Granite.	Price per foot. 12 in. by 6 in. granite flat kerb.	12 in. by 6 in. granite flat channel.	6 in. by 10 in. granite edge kerb.
		s. d.	s. d.	s. d.
A. Robinson	Annalong	1 1½	1 1½	0 11½
Penlee and St. Ives Stone Quarries, Ltd., Penzance*	Cornwall	1 3½	1 1½	1 1½
H. L. Cooper & Co.	Scotch	1 3½	1 1½	1 2½
Duke & Co., Ltd.	Devon	1 3½	1 2	1 3½
J. McKelvie & Co.	Scotch	1 4	1 2½	1 2
Pethick Bros., Ltd.	Dartmoor	1 4	1 6	1 5
Brookes, Ltd.	Norway	1 4½	1 4	1 3½
E. Jarrett	Norway	1 4½	1 3½	1 3½
A. & F. Manuelle	Norway	1 4½	1 4	1 3½
J. R. White & Co.	Norway	1 4½	1 4½	1 4
Blichfeldt & Co.	Norway	1 4½	1 3½	1 3½
Cornwall Granite Co., Ltd.	Cornwall	1 5	1 4½	1 2½
A. Stark & Sons	Scotch	1 6	1 6	1 4
J. Mowlem & Co., Ltd.	Guernsey	1 7½	1 7	1 5
Fry Bros.	Guernsey	1 8½	1 8½	1 2
A. Falla	Guernsey	—	—	1 1½

CHELMSFORD.—For additions to Chelmsford and Essex Hospital and Dispensary, for the Building Committee. Messrs. Young & Hall and W. H. Pertwee, joint architects:—

J. Gowers, Chelmsford £4,820 0 0

CHELTENHAM.—For a lodge at Lilleybrook, Cheltenham, for Mr. H. O. Lord. Messrs. Prothero, Phillott, & Barnard, architects, 13, Promenade, Cheltenham:—

A. C. Billings & Sons £743 0 0
A. Wilson 742 0 0
Collins & Godfrey, Cheltenham* 727 0 0

CORK.—For erecting a villa at Gregg's Cross, Ballinlough. Mr. J. F. M'Mullen, J.P., M.R.I.A.I., architect, 30, South Mall, Cork. Quantities not supplied:—

P. Fitzgerald	£925	J. Kearns & Son	£828
Duggan Bros.	896	E. Barrett	815
P. Murphy	850	J. Delany & Co., Henry-street, Cork*	782
A. Gaul	835		

[Architect's estimate, £800.]

CROSBY.—For paving, kerbing, channelling six streets, for Glanford Brigg Rural District Council. Mr. A. M. Cobban, Surveyor, Scunthorpe:—

H. Ashley, Mansfield, Notts £1,792 6 6

CROYDON.—For new buildings in connexion with Mental Hospital, for the Croydon Corporation:—

Builders' Work.

B. E. Nightingale, Albert Works, Albert-embankment, London, S.E.* £21,143 0 0

Heating.

Tilley Bros., 53, Kingsland-road, London, N.E.* £1,761 17 4

Electric Lighting.

C. Pullan, 52, King's Arcade, Market-street, Bradford* £428 0 0

CROYDON.—Group of schools at Tavistock-road, for the Croydon Corporation:—

W. Wallis, High-road, Balham, S.W.* .. £12,100

EGREMONT (Cumberland).—For alterations to Wesleyan chapel. Mr. J. S. Stout, architect and surveyor, 36, Lowther-street, Whitehaven:—

J. Moffat, Egremont, Cumberland*‡ £225

‡ All trades except painter.

ELGIN. — For 720 sq. yds. of concrete pavements, for the Town Council. Mr. A. A. Turriff, Burgh Surveyor, Elgin:—

Sellar & Co.	£142 9 6	A. Davidson & Son	£130 7 6
J. Scott & Son	142 9 6	R. Fraser & Son, Elgin*	127 12 6
J. Brodie & Son	136 13 0		
G. Murray	134 14 0		

GRAVESEND.—For erecting an electrical sub-station at Rosherville, for the Town Council. Mr. F. T. Grant, Borough Surveyor. Quantities by Mr. W. H. Smith, 5, Great Winchester-street, E.C.:—

W. E. Thomas	£893	E. Pavitt & Sons	£782
T. W. Hooker	836	W. T. Burrows	748
W. & F. Tuffee	810	W. Blay	743
J. Lonsdale	803	G. Wallis & Sons	737
Multon & Wallis	799	A. E. Tong, Gravesend*	724
H. W. Martin	784		

LIVERPOOL.—For erecting new male and female imbecile hospitals at the Workhouse, Smithdown-road, Liverpool, for Toxteth Park Guardians. Mr. W. W. Thomas, M.S.A., architect and surveyor, 15, Lord-street, Liverpool. Quantities by the architect:—

W. Thornton & Sons	£20,500	Jones & Sons	£19,783
S. Webster	20,436	W. Tomkinson & Sons	19,449
J. Henshaw & Sons	20,399	Morrison & Sons	19,140
I. Dilworth	20,250	J. Gerrard	19,015
J. & G. Chappell	20,000	T. Spencer	18,500
J. Patterson & Sons	19,997	Bullen Bros. & Sons	17,736
P. Tyson	19,885	C. W. Davenport	17,438
Brown & Backhouse	19,811		

LONDON.—For supplying electrical fittings, for the new Offices of Holborn Borough Council:—

T. Elsley, Ltd.	£542 15 0
Galsworthy, Ltd.	477 8 0
Hart, Son, Peard, & Co., Ltd.	472 7 6
D. Hulett & Co., Ltd.	390 6 0
Ditto (alternative)	451 15 5
J. W. Singer & Sons, Ltd., 1, Arundel-street, Strand, W.C.*	388 17 6

LONDON.—For the supply of 200 tons of Scotch Inverkeithing granite, for the Southwark Borough Council:—

	Per ton. s. d.
Mr. H. Timms, 19, Eastcheap, E.C.	11 0

LONDON.—Induced draught plant to boilers of electricity station of Southwark Borough Council:—

—	Fan. £ s. d.	Motor, etc. £ s. d.	Total. £ s. d.
J. Howden & Co.	325 0 0	347 0 0	672 0 0
Sturtevant Engineering Co.	235 0 0	235 0 0	470 0 0
Davidson & Co.	(inclusive)		395 0 0
Musgrave & Co.	140 0 0	264 15 0	404 15 0
General Electric Co.	125 0 0	219 10 0	344 10 0
Crompton & Co.	177 10 0	278 0 0	455 10 0
Buffalo Forge Co.	125 0 0	222 10 0	347 10 0
Puley & Austin	155 0 0	242 0 0	397 0 0
Baxter & Gaunter	168 0 0	237 10 0	405 10 0
Electric Ordnance Accessories Co.	(inclusive)		485 10 0
Electrical Construction Co.*	(inclusive)		330 0 0
Lancs. Dynamo and Motor Co., Ltd.	180 0 0	263 15 0	443 15 0
Bumsted & Chader	188 10 0	266 10 0	455 0 0
Mather & Yates	152 0 0	222 10 0	374 10 0
Mather & Platt	160 0 0	295 0 0	455 0 0
Siemens Bros. & Co., Ltd.	(inclusive)		417 0 0
J. Crawford	164 10 0	303 0 0	467 10 0
Heeman & Froude	194 0 0	225 0 0	419 0 0

LONDON.—Apparatus for new infirmary buildings, etc., at Homerton, for City of London Board of Guardians. Mr. A. E. Pridmore, Architect, Union Offices, 61, Bartholomew Close, E.C.:—

Cooking Apparatus, &c.

Benham & Sons	£1,339 10 0
A. Ritchie & Co.	1,065 10 0
Davis Gas Stove Co.	994 0 0
Carran Co.	838 3 6
McDowell, Stevens, & Co., 4, Upper Thames-street, E.C.*	813 16 6

Heating and Hot Water Apparatus.

T. & F. May	£3,570 0 0
Kennell & Co.	2,640 0 0
Wenham & Waters, Paragon Works, Croydon*	2,409 0 0
W. Dennis	2,039 0 0

Laundry Machinery, Boiler, and Steam Main.

J. & F. May	£4,240 0 0
Manlove, Alliott, & Co.	3,445 11 0
Bradford & Co., 140-142, High Holborn, W.C.*	2,265 0 0

Disinfector and Steriliser.

Alliott & Paton*	£310 and £144

MISSON (Notts).—For a week-end cottage at Misson, near Bawtry, for all trades except painters, for Messrs. A. M. & J. M. Sutcliffe. Messrs. Bateman & Cowling, architects, Bond-street-chambers, Bradford:—

C. Sprakes & Sons	£595 0 0	W. Tarnish	£510 0 0
W. H. Holroyd	540 10 0	T. H. Marrison	480 0 0
J. Moulson & Son, Ltd.	532 10 0	G. F. Marrison	467 18 11
J. Stead & Son	530 0 0	D. Gill & Son, Doncaster*	433 0 0
		Wilks & Ingham	420 0 0

NEWTON ABBOT.—For enlargement of boys' Council school, Highweek, for the Devon County Education Authority. Mr. Percy Morris, County Architect (Education), 1, Richmond-road, Exeter. Quantities by Mr. S. W. Haughton, 22, Courtenay-street, Plymouth:—

F. C. Francis	£3,167 0 8
Pethick Bros., Ltd.	3,164 0 0
Lethbridge & Son	3,084 0 0
F. J. Zealley	3,045 5 5
Lapthorne & Co.	3,025 0 0
W. B. Crocker	3,018 7 9
Westcott, Austin, & White	2,985 5 9
H. Mills	2,943 15 6
H. C. Goss	2,943 0 0
W. G. Coles	2,919 9 2
J. Paynter	2,881 0 0
F. A. A. Stacey	2,872 0 0
F. J. Badcock	2,870 5 10
Parker Bros.	2,854 11 0
Wakeham Bros.	2,773 7 6
L. Bearne	2,741 12 1
W. E. Bennett, Bodmin*	2,683 1 2

OAKHAM (Rutland).—For cattle market, for Messrs. Royce. Messrs. J. B. Corby & Son, architects and surveyors, 15, All Saints'-place, Stamford. Quantities by architects:—

Hockley & Co.,	£2,483 0 0	C. Y. Barnes	£2,068 12 6
W. M. Freeman	2,397 0 0	J. Woolston	2,060 0 0
J. Cracknell	2,310 0 0	G. Edlington	2,039 7 0
W. Higgs	2,282 18 9	Nichols Bros., Oakham*	1,950 16 0
Hacksley Bros.	2,230 0 0		
S. F. Halliday	2,103 0 0		

ST. ALLEN.—For erecting stable, barn, and piggery, and for alterations to dwelling-house, outhouses, etc., at Marazanvose, for Col. Prideaux-Brune. Mr. H. Tresawna, architect, care of Shilson, Coode, & Co., St. Austell:—

C. & J. Harris	£193 0	G. Williams (mason)	£134 5
J. Tredinnick, St. Agnes*	175 0	R. Provis (carpenter)	129 0

SALISBURY.—For erecting caretaker's rooms and classrooms at Brown-street, for the Building Committee of Brown-street Baptist Church. Mr. A. C. Bothams, architect and engineer, 32, Chipper-lane, Salisbury. Quantities by architect:—

Tryhorn	£1,398	Burton	£1,285
Bishop	1,397	Smith & Bundy	1,255
Dawkins	1,360	Young Bros.	1,250
Wort & Way	1,390	Billet & Musselwhite	1,245
Vincent & Folland	1,350	Harris Bros.	1,205
Roles & Son	1,330	Day Bros.*	1,197
Dobman & Haynes	1,300		

SUTTON-ON-SEA.—For repairing sea-wall and promenade, for the Parish Council. Mr. C. T. Dennis, Surveyor of Sewers, Mablethorpe:—

Giles	£430	Thompson & Sons	£365
Clark	385	Moore, Sutton-on-Sea*	329

SOUTHALL.—For making-up West-end-road and Northcote-avenue, for Southall-Norwood Urban District Council. Mr. R. Brown, A.M.Inst.C.E., Public Office, Southall:—

	West End-road.	Northcote-avenue.
Champniss & Co.	£1,920 4 10	£1,417 2 6
Neave & Son	1,870 0 0	1,394 0 0
G. R. Mann	1,859 2 0	1,388 9 0
Seymour & Hanson	1,577 14 1	1,272 14 0
Dykes	1,592 14 7	1,186 17 10
E. Plaistowe	1,501 8 0	1,125 1 10
Free & Sons	1,482 3 9	1,108 2 9
T. Watton, jun.	1,456 6 4	1,089 3 11
W. E. Rhodes	1,461 0 0	1,077 5 0
A. & B. Hanson Southall‡	1,422 0 0	1,056 0 0
Engineer's estimate	1,511 4 6	1,143 14 6

‡Accepted subject to the usual conditions.

TWICKENHAM.—For an underground convenience at the corner of York-street and London-road, for the Urban District Council. Mr. F. W. Pearce, F.S.I., Surveyor, Town Hall, Twickenham:—

G. Jennings & Co., Ltd., Lambeth Palace-road, S.E.	£1,472

WHITEHAVEN.—For southern district waterworks (Contract No. 1), for the Rural District Council. Mr. H. W. Taylor, A.M.Inst.C.E., St. Nicholas-chambers, Newcastle-on-Tyne, and Mr. G. Boyd, C.E., 33, Queen-street, Whitehaven:—

J. Taylor, 12, Mason-street, Workington*	£5,078

WHITEHAVEN.—For southern district waterworks (Contract No. 2), for the Rural District Council. Mr. H. W. Taylor, A.M.Inst.C.E., St. Nicholas-chambers, Newcastle-on-Tyne, and Mr. G. Boyd, C.E., 33, Queen-street, Whitehaven:—

Staveley Coal and Iron Co., Staveley Iron Works, Chesterfield*	£5,522

WOOTTON BASSETT (Wilts).—For the erection of farm buildings, Marsh Farm, for Mr. Howard Horsell. Messrs. Drew & Sons, M.S.A., architects, Regent-circus, Swindon:—

W. E. Chequer	£521 10 10	A. J. Colborne	£475 0 0
Trow & Son	520 0 0	G. Kilminster	454 17 0
Tydeman Bros.	494 15 0	H. & C. Spackman, Swindon*	450 0 0
W. J. C. Tarrant	482 14 6		
Pope Bros.	476 8 0		

WREXHAM.—For sewer extension at Brymbo, for the Rural District Council. Mr. J. Price Evans, engineer, Argyle-chambers, Wrexham:—

T. H. Simmons	£285 6 9
R. Williams, Brymbo*	251 2 9

CORRECTION.—With reference to the list of tenders for a new school at the Hyde, Hendon, which appeared in our last issue, we are asked to state that the name A. E. Nightingale was incorrect. It should have been B. E. Nightingale.

Ham Hill Stone.
Doulting Stone.
Portland Stone.
The Ham Hill and Doulting Stone Co., Limited
(Incorporating the Ham Hill Stone Co. and C. Trask & Son, The Doulting Stone Co.).
Norton, Stoke-under-Ham, Somerset.
London Agent:—Mr. E. A. Williams, 16, Craven-street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

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HAVELOCK WORKS, LITHERLAND, LIVERPOOL.
ASHTON GATE WORKS, BRISTOL.
ECLIPSE WORKS, PETERSHILL RD., GLASGOW.
59, VICTORIA STREET, BELFAST.
9, SOUTH PRINCES STREET, DUBLIN.